ORDER NO. SD82032134C8

Service Manual

FM/AM Stereo Receiver

SA-104

[EX],[EH],[XA],[XL]

SA-104 (K)

[EX],[EH]

* The cabinet, front panel and knob are available in black color and silver types.
* The black type model is provided with (K) in the service Manual.

Areas

* [EX] is available in Switzerland and Scandinavia.
* [EH] is available in Holland.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.

Specifications (DIN 45 500)

(Specifications are subject to change without notice for further improvement.)

■ AMPLIFIER SECTION

40 Hz~20 kHz continuous power output	
both channels driven	2 × 20W (4Ω)
	2 × 20W (8Ω)
40 Hz~16 kHz continuous power output	
both channels driven	2 × 20W (4Ω)
	2 × 20W (8Ω)
1 kHz continuous power output	
both channels driven	2 × 24W (4Ω)
	2 × 22W (8Ω)
Total harmonic distortion	
rated power at 40 Hz~20 kHz	0.08% (4Ω)
	0.04% (8Ω)
rated power at 40 Hz~16 kHz	0.08% (4Ω)
	0.04% (8Ω)
rated power at 1 kHz	0.04% (4Ω)
	0.04% (8Ω)
half power at 1 kHz	0.009% (8Ω)
−26 dB power at 1 kHz	0.1% (4Ω)
50 mW power at 1 kHz	0.12% (4Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.08%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.04%
Power bandwidth	
both channels driven, −3 dB	10 Hz~30 kHz (4Ω)
Damping factor	15 (4Ω), 30 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
AUX	150 mV/22kΩ
TAPE	150 mV/22 kΩ
TAPE REC/PLAY	180 mV/22kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power (4Ω)	
PHONO	70 dB (IHF, A: 73 dB)
AUX, TAPE	88 dB (IHF, A: 95 dB)
−26 dB power (4Ω)	
PHONO	64 dB
AUX, TAPE	66 dB
50 mW (4Ω)	
PHONO	62 dB
AUX, TAPE	62 dB
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
AUX, TAPE	7 Hz~70 kHz (−3 dB)
Tone controls	
BASS	50 Hz, +10 dB~ −10 dB
TREBLE	20 kHz, +10 dB~ −10 dB
Loudness control (volume at −30 dB)	50 Hz, +9 dB
Output voltage and impedance	
TAPE, REC OUT	150 mV
TAPE REC/PLAY	30 mV/82kΩ
Channel balance, AUX 250 Hz~6,300 Hz	±1 dB
Channel separation, AUX 1 kHz	55 dB
Headphones output level and impedance	210 mV/330Ω
Load impedance	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

■ FM TUNER SECTION

Frequency range	87.5~108 MHz
Sensitivity	
S/N 30 dB	1.9 μV (300Ω), 1.3 μV (75Ω)
S/N 26 dB	1.7 μV (300Ω), 1.2 μV (75Ω)
S/N 20 dB	1.5 μV (300Ω), 0.9 μV (75Ω)
IHF usable sensitivity	1.9 μV (IHF '58)
IHF 46 dB stereo quieting sensitivity	22 μV/75Ω
Total harmonic distortion	
MONO	0.15%
STEREO	0.3%
S/N	
MONO	60 dB (77 dB, IHF)
STEREO	58 dB (70 dB, IHF)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Frequency response	20 Hz~15 kHz, +1 dB~ −2 dB
Alternate channel selectivity	60 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	70 dB
Spurious response rejection at 98 MHz	80 dB
AM suppression	50 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	−35 dB (−35 dB, IHF)
38 kHz	−50 dB (−50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μV
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	300Ω (balanced) 75Ω (unbalanced)

Frequency range	525~1605 kHz
Sensitivity (S/N 20 dB)	30 μV, 300 μV/m
Selectivity	27 dB
Image rejection at 1,000 kHz	45 dB
IF rejection at 1,000 kHz	55 dB

■ GENERAL

Power consumption	210W
Power supply	AC 50 Hz/60 Hz, 240V (For United Kingdom and Australia) AC 50Hz/60Hz, 220V (For continental Europe) AC 50 Hz/60 Hz, 110V/120V/220V/240V (For others)
Dimensions (W×H×D)	430 × 97 × 260 mm (16-15/16" × 3-13/16" × 10-1/4")
Weight	5.4 kg (11.9 lb.)

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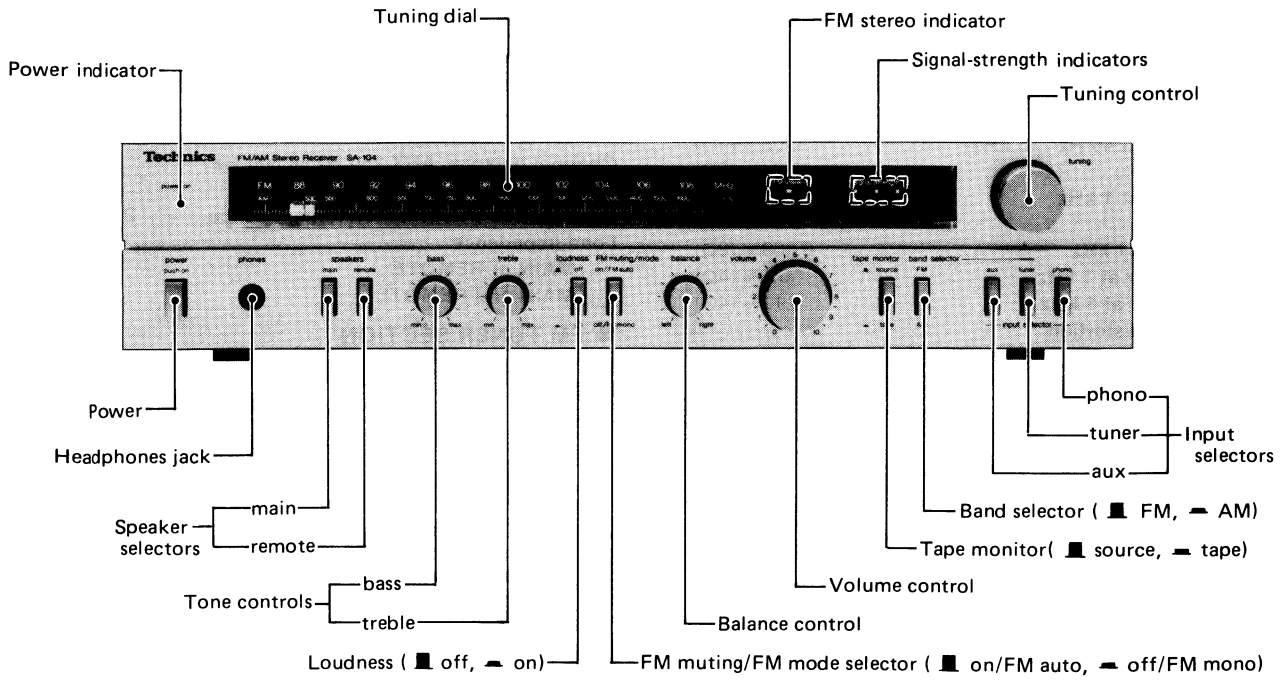
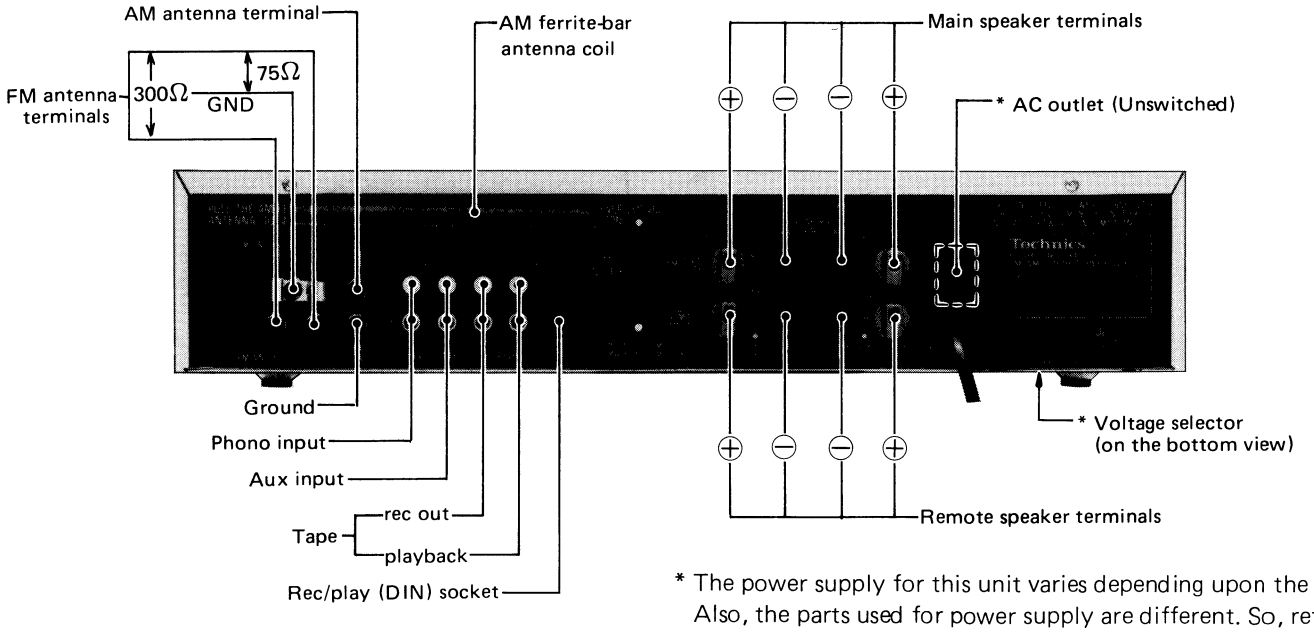
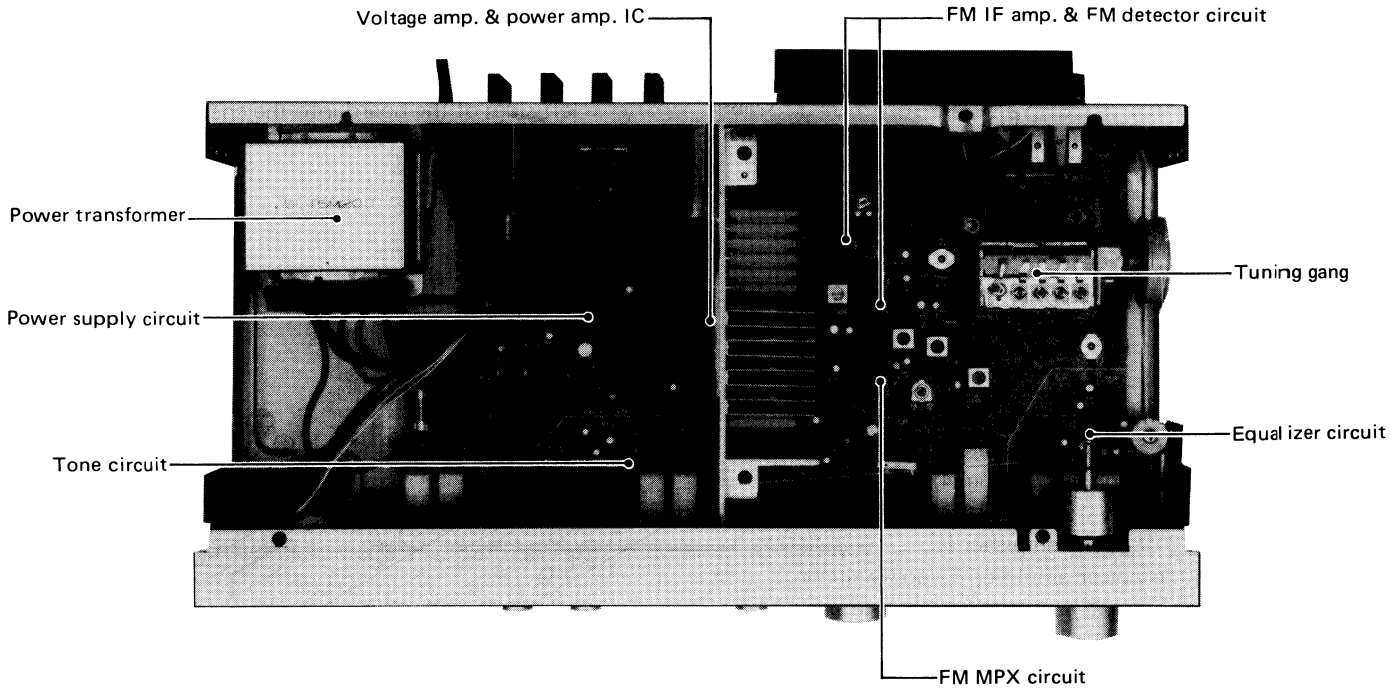
■ LOCATION OF CONTROLS





* The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different. So, refer to the circuit diagram and the replacement parts list.
* [XA] area is provided with voltage selector and AC outlet.
* Phono input capacitance is about 150pF.



■ BEFORE REPAIR AND ADJUSTMENT

Turn off the power supply and short-circuit both ends of power supply condensers (C701, C702, 4700μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Avoid short-circuit with a screwdriver or the like, otherwise the transistors or diodes may break down.

Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a voltage regulator to make sure that the current consumed is free of abnormality. The current consumed at 60Hz/50Hz in no-signal mode is 110V: (120 ~ 300mA), 120V: (100 ~ 240mA), 220V: (50 ~ 150mA), 240V: (40 ~ 120mA).

■ DISASSEMBLY INSTRUCTIONS

• How to remove the cabinet

1. Remove the 6 setscrews (Fig. 1: ❶ ~ ❻) of the cabinet.

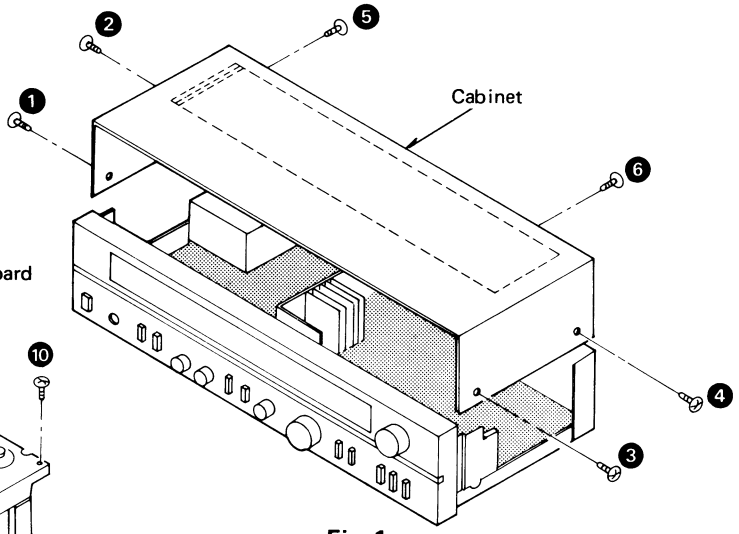


Fig. 1

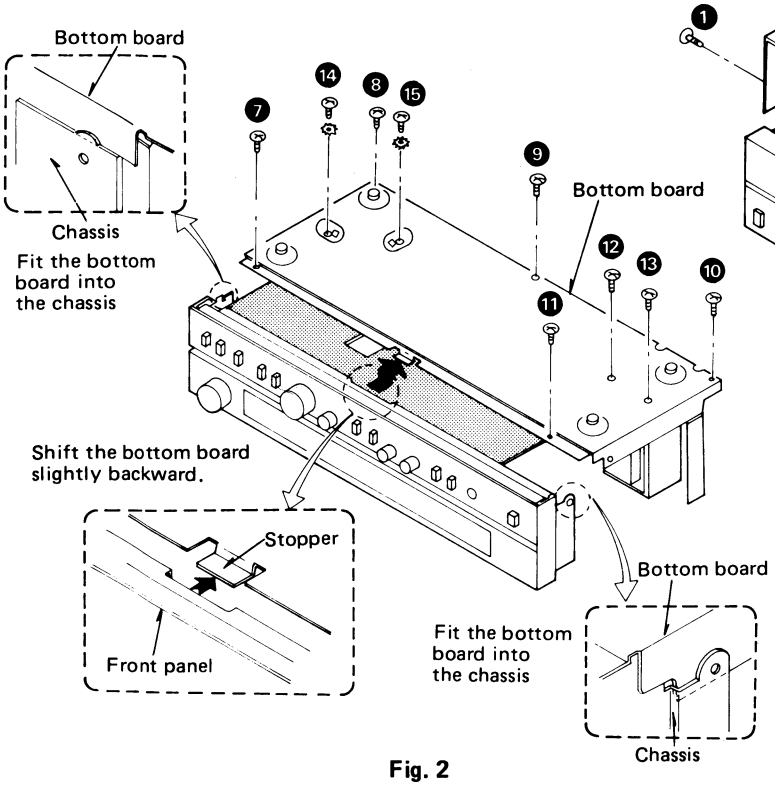


Fig. 2

• How to remove the bottom board

1. Remove the cabinet.
2. Remove the 9 setscrews (Fig. 2: ❼ ~ ⓯) of the bottom board.
3. Remove the bottom board as shown in Fig. 2.
4. When attaching the bottom board, fit the right and left sides of the board into the chassis.

• How to remove the front panel

1. Remove the cabinet.
2. Remove the 4 setscrews (Fig. 3: ⓰ ~ ⓳) of the front panel.

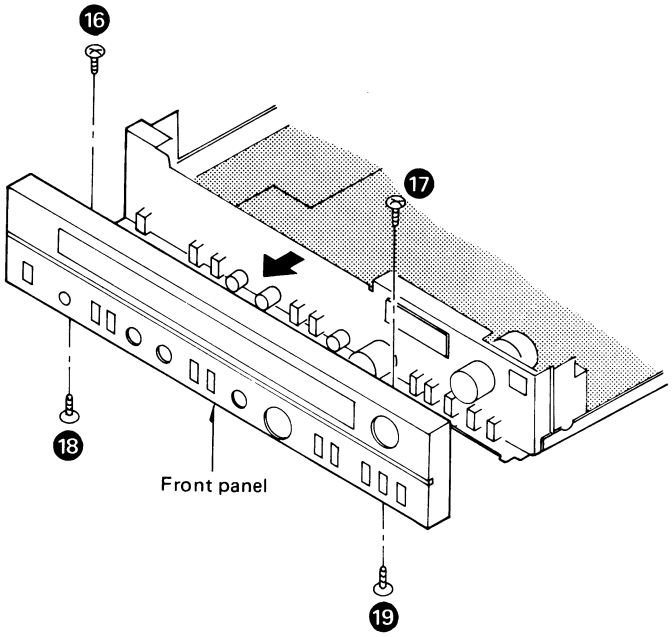


Fig. 3

• How to remove the power amplifier IC.

1. Remove the cabinet and bottom board.
2. Unsolder the power amplifier IC. (Fig. 4)
3. IC can be detached by removing the 2 setscrews. (Fig. 5: ⓴ , ㉑) of power amplifier IC.
4. When mounting the power amplifier IC, apply silicon compound (or equivalent heat diffuser) to the back of power amplifier IC.

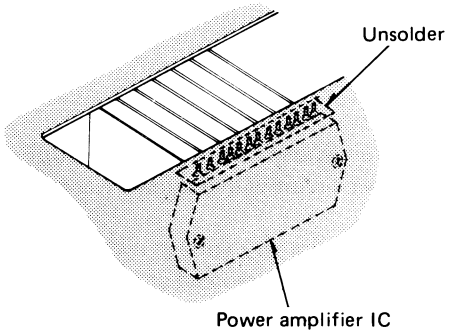


Fig. 4

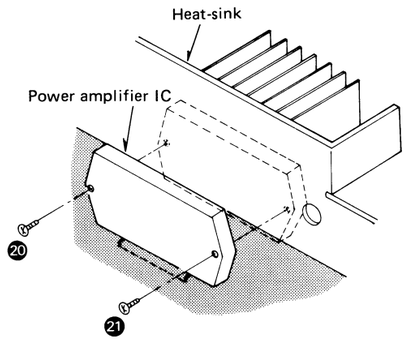


Fig. 5

- **How to check the printed circuit board**

1. Remove the cabinet and bottom board.
2. Raise the chassis as shown in Fig. 6.

Note) Measure the voltage on the basis of the earth line of the printed circuit board.

- **How to replace the pilot lamp (Fig. 7)**

1. The pilot lamp can be removed by pulling it out of the cover.
2. When inserting the pilot lamp, be sure to insert it with the blue lamp down.

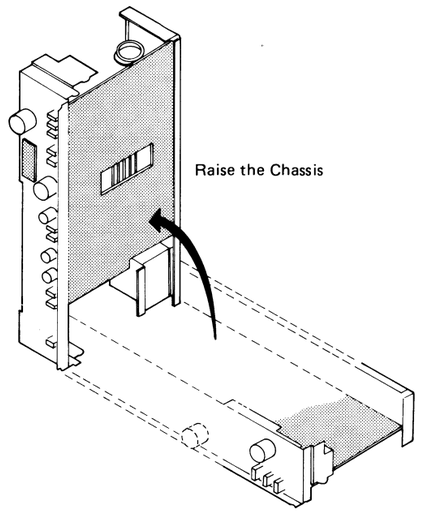


Fig. 6

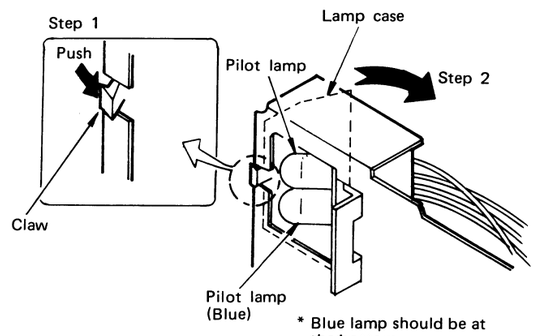


Fig. 7

■ DIAL CORD INSTALLATION GUIDE

* For threading a fresh cord, proceed as follows. (Fig. 8)

1. Prepare a fresh cord more than 180cm (70-15/16") in length.
2. Bring the variable capacitor into a state where the drum is completely turned to the right (maximum capacity and lowest frequency for the variable capacitor.)
3. Direct the cord in the order from 1 to 7.
4. Stretch the cord in such a tension as the spring length is elongated by 1.5 times that of the original state.
5. Fix the knot of the cord with the adhesive.

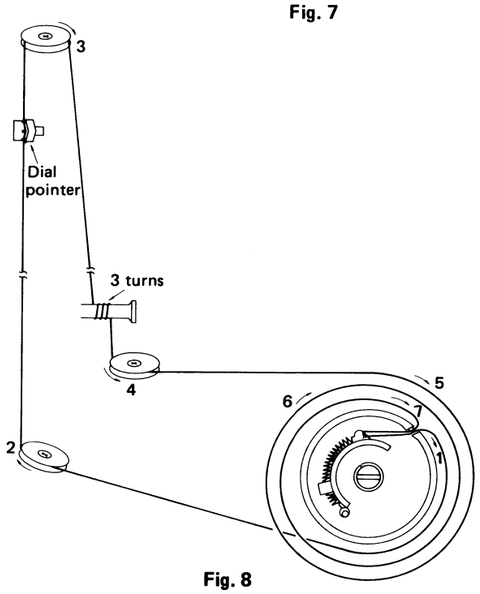


Fig. 8

■ TECHNICAL GUIDE

1. Muting (shock noise prevention) with power switch ON.

- When power is turned "on", (−B) is applied to the base of Q701 through R713 and R709, turning Q701 ON.
- As Q701 turns ON, Q702 turns OFF and −B of IC601 is cut off. (state of muting)
- Two or 3 sec. later, (+B) is applied from D702 to the base of Q701, turning Q701 OFF and Q702 ON, and then −B is applied to IC601 causing muting to be discontinued.

2. Muting (shock noise prevention) with power switch OFF.

- When power is turned "off", the level of (+B) from D702 drops fast but the voltage of (−B) becomes negative at the base of Q701 due to the large capacity condenser (C702) connected, thus cutting off −B of IC601 in the same way as power is turned "on".

3. Operation of the protection circuit with speaker terminal short-circuited.

- Q601 is usually OFF. When the speaker terminal is short-circuited to ground, a large amount of current flows to the power amplifier IC601 causing a voltage to be generated at R615, and then Q601 turns ON.
- When Q601 turns ON, the base voltage of Q703 rises causing both Q703 and Q704 to turn ON. (hold circuit)
- As Q704 is ON, the emitter voltage of Q704 drops causing the base voltage of Q701 to decrease as well.
- Thus, Q702 turns OFF in the same way as in muting operation and −B of IC601 is cut off.

Note: If this protection circuit works for muting operation, set the power switch to "on" about 30 seconds after turning it "off" even when the power amplifier and the load are free of abnormality, otherwise normal operation cannot be restored. This protection circuit using a hold circuit is employed in SA-103, SA-222, etc.

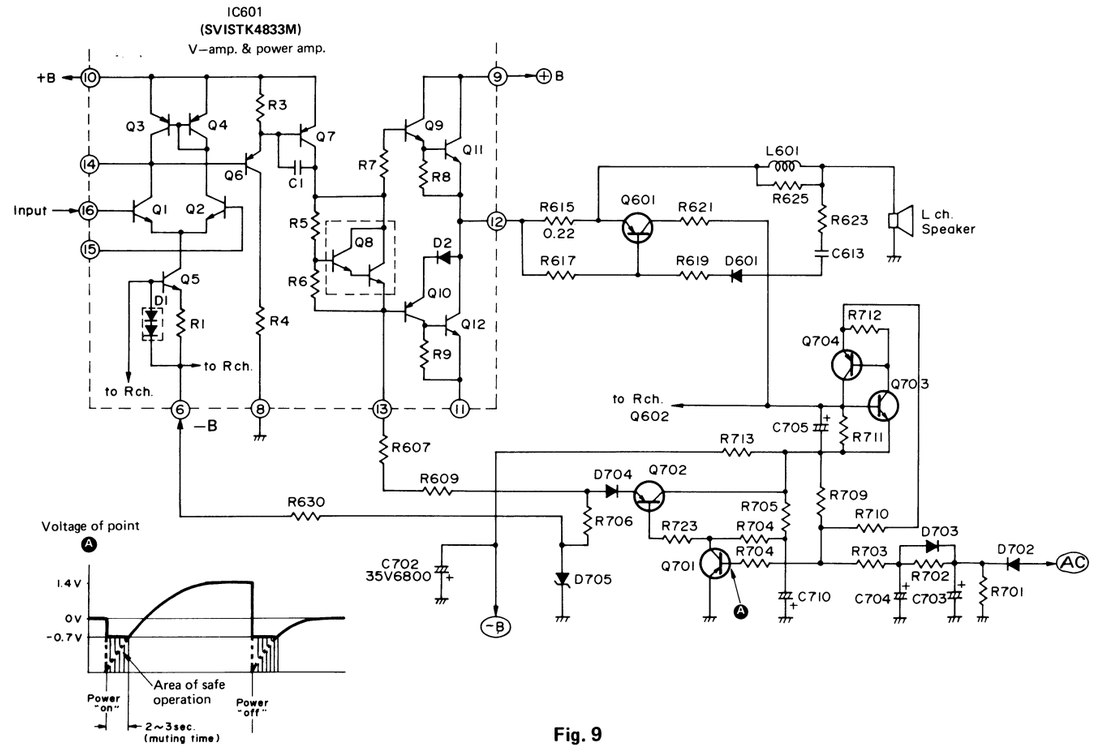


Fig. 9

■ MEASUREMENTS AND ADJUSTMENTS

AM ADJUSTMENT

• Setting and Equipment use

1. AC and DC electronic voltmeters (VTVM).
2. AM signal generator (AM-SG).
3. Oscilloscope.
4. Maintain line voltage at rated voltage.
5. Output of signal generator should be no higher than necessary to obtain an output reading.
6. Pull the AM ferrite-bar antenna (L201) outward.
7. Use a non-metal screwdriver for the adjustment.

Step. No.	AM/FM SIGNAL GENERATOR CONNECTION	AM/FM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	08-E05-01	**AM-RF ADJUSTMENT**				
1	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input).	600kHz (30% Mod. with 400Hz)	600kHz	Connect AC VTVM or scope to "SPEAKER" terminals.	L202 (AM OSC Coil) L201 (AM ANT Coil)	1. Adjust for maximum output. 2. Adjust L201 by moving coil bobbin along ferrite core.
2		1500kHz (30% Mod. with 400Hz)	1500kHz	Connect AC VTVM or scope to "SPEAKER" terminals.	CT202 (AM OSC Trimmer) CT201 (AM ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2).

FM ADJUSTMENT

• Equipment used

1. FM signal generator (FM-SG).
2. Stereo modulator (or separation meter).
3. Oscilloscope.
4. AC and DC electronic voltmeters (VTVM).
5. Frequency counter (19kHz and 108MHz measurable).
6. FM 300Ω dummy antenna.

• Preparation of FM signal generator (FM-SG).

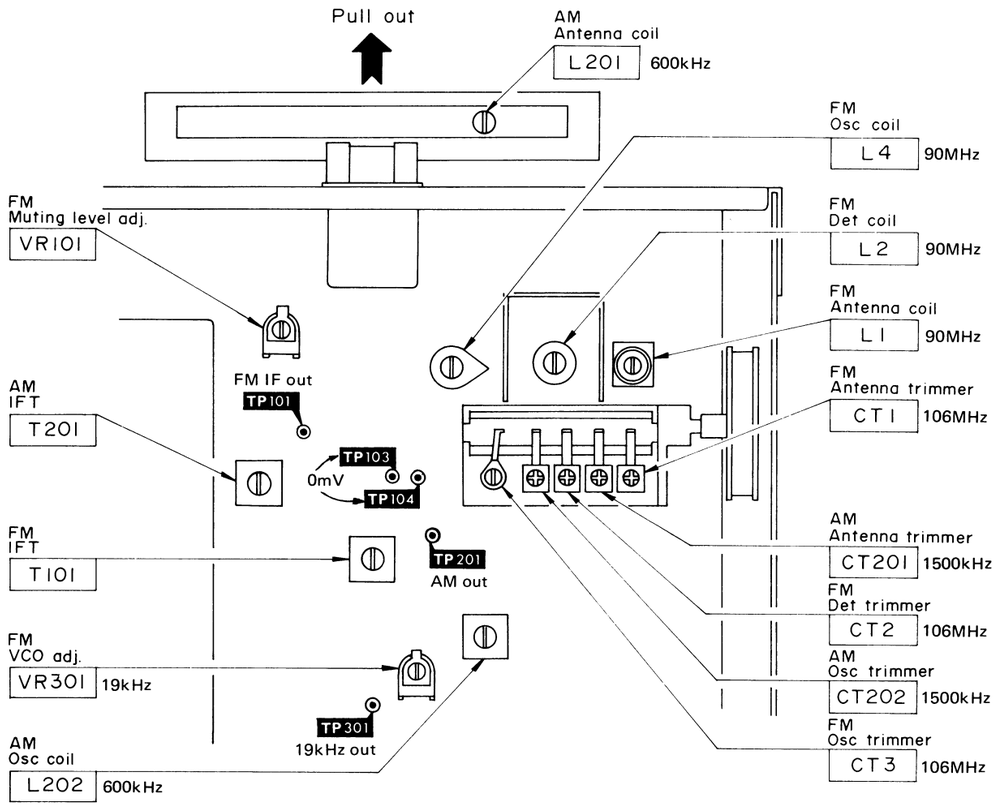
1. Connect stereo modulator to FM-SG.
2. Apply SG output to antenna terminal of the set through 300Ω FM dummy antenna.
3. The standard input of the set is 60dB (1mV), 400Hz 100% modulation (Because of using dummy antenna, SG output must be 12dB plus (IHF). That is, when input is 60dB, SG output is to be 72dB).

• Setting

1. Band selector.....FM.
2. FM muting/mode switch.....off/mono.

Step. No.						
	FM-IF ADJUSTMENT					
3	——	No Signal	Point of noninter-ference.	Connect DC VTVM between **TP103** and **TP104** terminal through choke coil. (Refer to Fig. 10)	T101 (Discri. IFT)	1. FM muting/mode switch to "on/FM auto" position. 2. Adjust T101 core so that voltage measured in signal mode is 0mV in 300mV range.
	FM-RF ADJUSTMENT					
4	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna.	90MHz (100% Mod. with 400Hz) Weak input.	90MHz	Connect scope to "SPEAKER" terminal.	L4 (OSC Coil) L1 (ANT Coil) L2 (RF DET Coil)	1. Add weak input so that noise is included in the output wave form. 2. Make the adjustment so that the output wave form is vertically symmetrical. (Fig. 11). 3. Repeat the steps (4) and (5) until the frequency correctly matches the dial scale.
5		106MHz (100% Mod. with 400Hz) weak input.	106MHz	Connect scope to "SPEAKER" terminal.	CT3 (OSC Trimmer) CT2 (ANT Trimmer) CT1 (RF DET Trimmer)	
	FM MUTING LEVEL ADJUSTMENT					
6	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna. Apply 21dB to tuner.	100MHz (100% Mod. with 400Hz)	100MHz	Connect AC VTVM or scope to "SPEAKER" terminals.	VR101 (Muting level)	1. Set the FM muting/mode to "on/auto". 2. Adjust so that output can be obtained.
	FM MPX V.C.O. ADJUSTMENT					
	USING A FREQUENCY COUNTER			**USING ALTERNATE SYSTEM**		
7	1. 100MHz 60dB Non-modulated mono signal applied to set. 2. FM muting/mode switch to "on/FM auto". 3. Connect frequency counter to **TP301** through resistor (100kΩ). 4. Adjust **VR301** to 19kHz±30Hz.			1. Apply a stereo signal to the set or receive a stereo broad cast. 2. Adjust **VR301** and fix the sliding contact of **VR301** in the middle of the stereo indicator ON-range. (See Fig. 12.)		

• Adjustment points



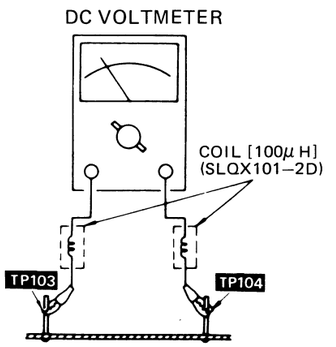
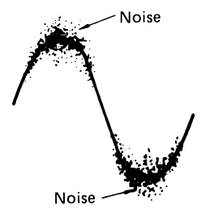
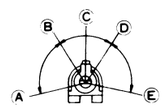


Fig. 10 (Abb. 10)



AF output wave form

Fig. 11 (Abb. 11)



VR301

A – B, D – E : Stereo OFF.
B – D : Stereo ON. (indicator ON).
C : Pilot circuit adjusting point. (in the middle of B – D).

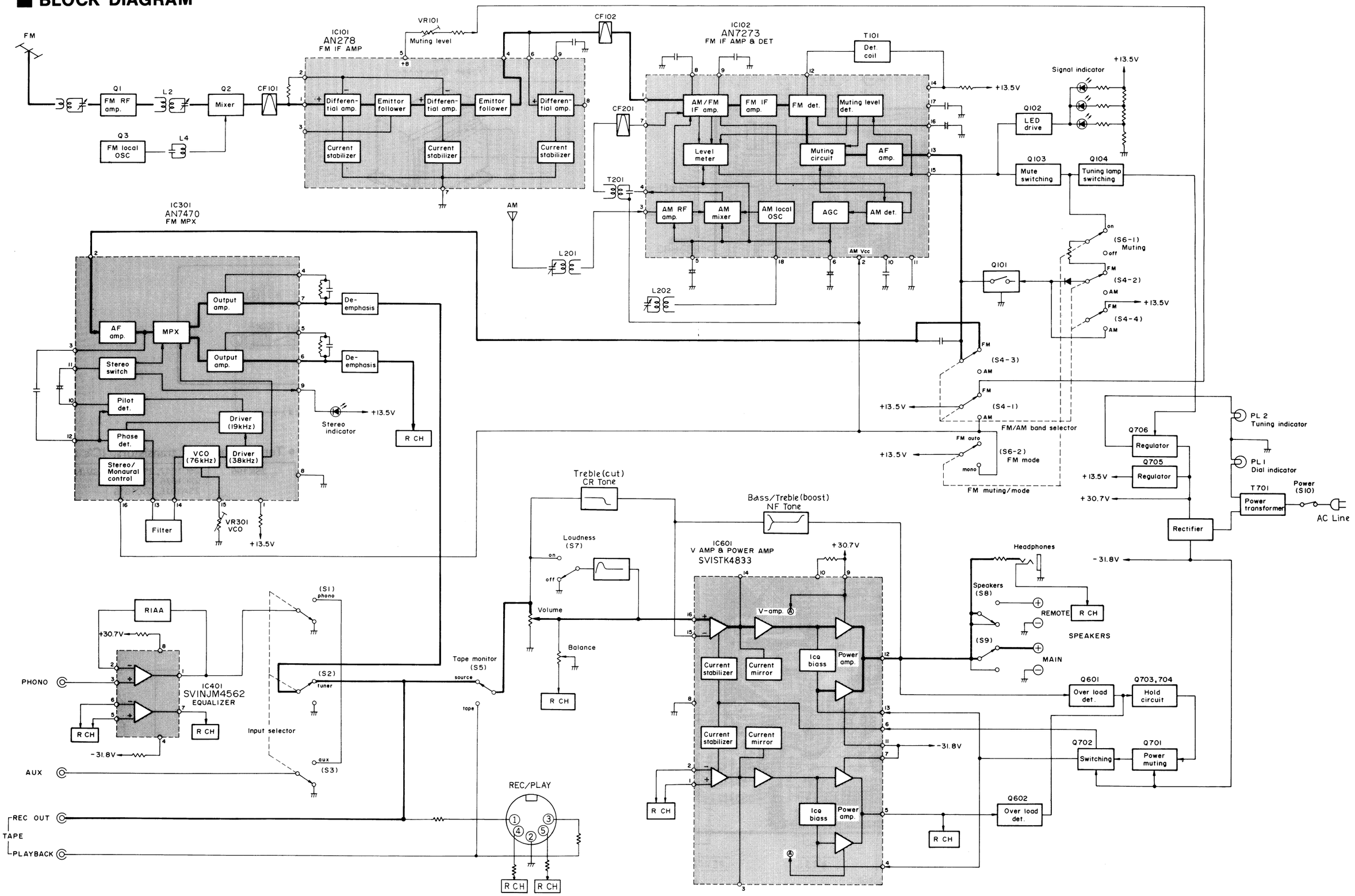
Fig. 12 (Abb. 12)

• Check point

Overload detection circuit

① Connect 8Ω load to "main" speaker terminal and 5W 0.33Ω resistance to "remote" speaker terminal.
② Apply 1kHz 100mV signal to "TUNER" terminal.
③ Make the sound volume maximum.
④ With speaker selector set at main and remote, make sure that relay in the set is OFF and no output is delivered.

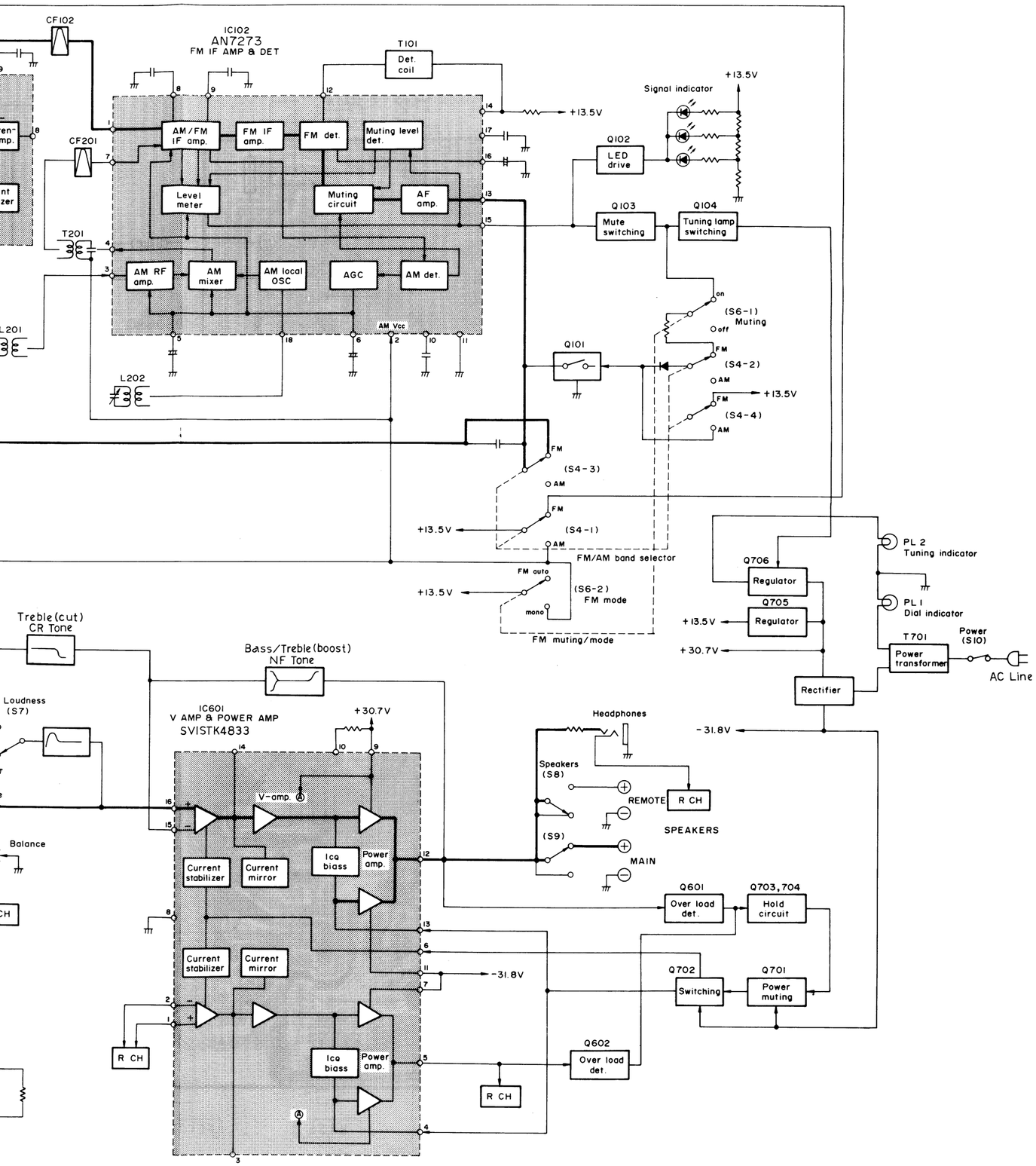
■ BLOCK DIAGRAM



■ REPLA

Notes: 1. 2. 3. 4.

Ref. No.	
INTEGRATED CIRC	
IC101	
IC102	
IC301	
IC401	
IC601	
TRANSISTORS	
Q1	
Q2	S
Q3	S
Q101 ~ 104	S
Q601, 602	
Q701, 702	
Q703	
Q704	
Q705, 706	
DIODES	
D101	
D103	S
D104 ~ 106	
D107	
D108	S
D201	S
D601, 602	S
D701	⚠
D702	S ⚠
D703, 704	S
D705	S
D706, 707	
D708	
COILS and TRANS	
L1	
L2	
L3	
L4	
L201	
L202	
L301 [EX, EH] only	
L601, 602	
T101	
T201	
T701 [EX, EH]	⚠ MSA
T701 [XA]	⚠ JPN
T701 [XL]	⚠ JPN
COMPONENT COM	
Z1	
Z301, 302	
Z601, 602	
Z701, 702	



9 10

■ REPLACEMENT PARTS LIST ..... Electrical Parts

Notes:
1. Parts numbers are indicated on most mechanical parts. Please this part number for parts orders.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components use only manufacturer's specified parts.
3. Bracketed indicators in Ref. No. columns specify the area.
   Parts without these indications can be used for all areas.
4. The "S" mark is service standerd parts and may differ from production parts.

Areas
* [EX] is available in Switzerland and Scandinavia.
* [EH] is available in Holland.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.

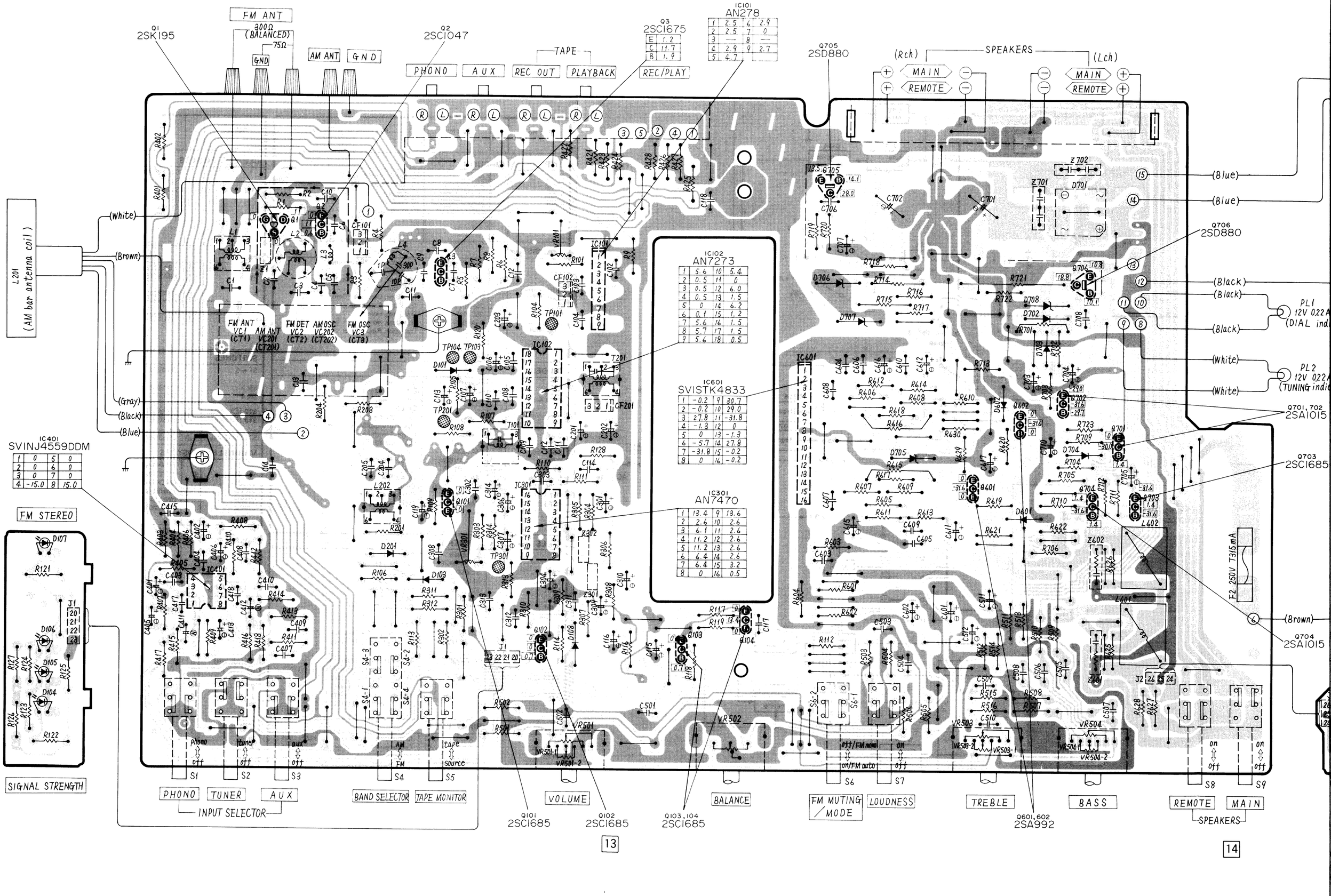
Ref. No.		Part No.	Part Name & Description
INTEGRATED CIRCUITS			
IC101		AN278	IC, FM-IF Amplifier
IC102		AN7273	IC, AM Converter, FM-IF Amplifier
IC301		SVIUPC1161C3	IC, FM Stereo Decorder (MPX)
IC401		SVINJ4559DDM	IC, Equalizer Amplifier
IC601		SVISTK4833M	IC, Power Amplifier
TRANSISTORS			
Q1		2SK195–H2	Transistor, FM RF Amplifier
Q2	S	2SC1047–C	Transistor, FM Mixer
Q3	S	2SC1675–L	Transistor, FM Local Oscillator
Q101 ~ 104	S	2SC1685–S	Transistor, Switching
Q601, 602		2SA992–E	Transistor, Over Load Detector
Q701, 702		2SA1015–Y	Transistor, Switching
Q703		2SC1815–Y	Transistor, Hold
Q704		2SA1015–Y	Transistor, Hold
Q705, 706		2SD880–Y	Transistor, Ripple Filter
DIODES			
D101		MA27W–A	Diode, Switching
D103	S	MA162A	Diode, Switching
D104 ~ 106		LN446YP	Light Emitting Diode
D107		LN846RP	Signal Strength Indicator Light Emitting Diode, Signal Strength & Stereo Indicator
D108	S	20A90	Diode, Switching
D201	S	MA162A	Diode, Switching
D601, 602	S	MA162A	Diode, Switching
D701	⚠	SVDS4VB20	Diode, Rectifier
D702	S ⚠	SVDSR1K2	Diode, Rectifier
D703, 704	S	MA162A	Diode, Switching
D705	S	RVDRD6R2EB	Diode, 6.2V Zener
D706, 707		MA2150B	Diode, 15V Zener
D708		MA1110	Diode, 11V Zener
COILS and TRANSFORMERS			
L1		SLA4N15	Coil, FM Antenna
L2		SLD4P69–P	Coil, FM Detector
L3		SLQ5A77–O	Coil, Choke
L4		SLO4P107–P	Coil, FM Oscillator
L201		SLF2C45	Coil, AM Antenna
L202		SLO2C1–P	Coil, AM Oscillator
L301 [EX, EH] only		SLM1C61–P	Coil, Low Pass Filter
L601, 602		SLQY15G–30	Coil, Choke
T101		SLI4C533–Z	Transformer, FM Detector
T201		SLI2C139–M	Transformer, FM IFT (1st)
T701 [EX, EH]	⚠ MSA	SLT5M203	Transformer, Power Source (Made in Singapore)
T701 [XA]	⚠ JPN	SLT5M207	Transformer, Power Source (Made in Japan)
T701 [XL]	⚠ JPN	SLT5M209	Transformer, Power Source (Made in Japan)
COMPONENT COMBINATIONS			
Z1		EXRP150K104C	Component Combination, 100kΩ & 15pF
Z301, 302		EXRP181K473C	Component Combination, 47kΩ & 180pF
Z601, 602		ECQJ0517	Component Combination, 10Ω & 0.047μF
Z701, 702		SXRFS203ZSM	Component Combination, 0.01μF x 2

Ref. No.		Part No.	Part Name & Description
CERAMIC FILTERS			
CF101, 102		SVFE107MS2–A	Ceramic Filter, 10.7MHz
		SVFE107MS2–B	Ceramic Filter, 10.67MHz (use pair ranks as same as CF101, 102)
		SVFE107MS2–C	Ceramic Filter, 10.73MHz
		SVFE107MS2–D	Ceramic Filter, 10.64MHz
		SVFE107MS2–E	Ceramic Filter, 10.76MHz
CF201		SVFSFU450B	Ceramic Filter, AM-IF 450kHz
FUSE			
F1 [EX,EH,XL]	⚠	XBA2C08TRO	Fuse, 0.8A(250V)
F1 [XA]	⚠	XBA2C16TRO	Fuse, 1.6A(250V)
F2	⚠	XBA2C03TRO	Fuse, 0.3A(250V)
LAMP			
PL1, 2	⚠	SWL119	Lamp, 12V 0.22A
SWITCHES			
S1 ~ 5		SSH543	Switch, Input Selector, Band Selector & Tape Monitor
S6, 7		SSH2015	Switch, FM Muting/FM Mode & Loudness
S8, 9		SSH2017	Switch, Main Speaker & Remote Speaker
S10 [EX, XA]	⚠	ESB822S	Switch, Power Source
S10 [EH, XL]	⚠	ESB90619S	Switch, Power Source
S11 [XA] only	⚠	ESE37219	Switch, Voltage Adjuster
VARIABLE RESISTORS			
VR101		EVNK4AA00B33	Muting Level Adjustment, 3kΩ (B)
VR301	S	EVTS3MA00B53	PLL VCO Adjustment, 5kΩ (B)
VR501		EWCXTA000B15	Volume Control, 100kΩ (B)
VR502		EWH51AF20G15	Balance Control, 100kΩ (G)
VR503		EWCS5AF20012	Treble Control
VR504		EWCSWAF20C15	Bass Control, 100kΩ (C)
VARIABLE CAPACITOR			
VC1, 2, 3 201, 202 (CT1, 2, 3 201, 202)		ECV5MD34X71G	Tuning Gang, FM & AM (with Trimmer)
RESISTORS			
R1	S	ERD25FJ220	Carbon, 1/4W, 22Ω, ±5%
R2	S	ERD25FJ221	Carbon, 1/4W, 220Ω, ±5%
R3	S	ERD25TJ564	Carbon, 1/4W, 560kΩ, ±5%
R4	S	ERD25FJ391	Carbon, 1/4W, 390Ω, ±5%
R5	S	ERD25FJ103	Carbon, 1/4W, 10kΩ, ±5%
R6	S	ERD25TJ473	Carbon, 1/4W, 47kΩ, ±5%
R7 [EX, EH]	S	ERD25FJ102	Carbon, 1/4W, 1kΩ, ±5%
R7 [XA, XL]	S	ERD25FJ681	Carbon, 1/4W, 680Ω, ±5%
R8	S	ERD25FJ331	Carbon, 1/4W, 330Ω, ±5%
R9	S	ERD25FJ820	Carbon, 1/4W, 82Ω, ±5%
R101	S	ERD25FJ331	Carbon, 1/4W, 330Ω, ±5%
R102, 104	S	ERD25FJ471	Carbon, 1/4W, 470Ω, ±5%
R105	S	ERD25FJ681	Carbon, 1/4W, 680Ω, ±5%
R106	S	ERD25FJ331	Carbon, 1/4W, 330Ω, ±5%
R107	S	ERD25FJ122	Carbon, 1/4W, 1.2kΩ, ±5%
R108	S	ERD25TJ153	Carbon, 1/4W, 15kΩ, ±5%
R109	S	ERD25TJ104	Carbon, 1/4W, 100kΩ, ±5%

Continued on page 19.

■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

Ground (Earth) lines



IC401			
1	0	5	0
2	0	6	0
3	0	7	0
4	-15.0	8	15.0

IC102			
1	5.6	10	5.4
2	0.5	11	0
3	0.5	12	6.0
4	0.5	13	1.5
5	0	14	6.2
6	0.1	15	1.2
7	5.6	16	1.5
8	5.7	17	1.5
9	5.6	18	0.5

IC601			
1	-0.2	9	30.7
2	-0.2	10	29.0
3	27.8	11	-31.8
4	-1.3	12	0
5	0	13	-1.3
6	-5.7	14	27.8
7	-31.8	15	-0.2
8	0	16	-0.2

IC301			
1	13.4	9	13.6
2	2.6	10	2.6
3	6.1	11	2.6
4	11.2	12	2.6
5	11.2	13	2.6
6	6.4	14	2.6
7	6.4	15	3.2
8	0	16	0.5

IC101			
1	2.5	6	2.9
2	2.5	7	0
3	—	8	—
4	2.9	9	2.7
5	4.7		

Q3 2SC1675	
E	1.2
C	11.7
B	1.9

Ground (Earth) lines

IC101 AN278

1	2.5	6	2.9
2	2.5	7	0
3	—	8	—
4	2.9	9	2.7
5	4.7		

Q3 2SC1675

E	1.2
C	11.7
B	1.9

IC102 AN7273

1	5.6	10	5.4
2	0.5	11	0
3	0.5	12	6.0
4	0.5	13	1.5
5	0	14	6.2
6	0.1	15	1.2
7	5.6	16	1.5
8	5.7	17	1.5
9	5.6	18	0.5

IC601 SVISTK4833

1	-0.2	9	30.7
2	-0.2	10	29.0
3	27.8	11	-31.8
4	-1.3	12	0
5	0	13	-1.3
6	-5.7	14	27.8
7	-31.8	15	-0.2
8	0	16	-0.2

IC301 AN7470

1	13.4	9	13.6
2	2.6	10	2.6
3	6.1	11	2.6
4	11.2	12	2.6
5	11.2	13	2.6
6	6.4	14	2.6
7	6.4	15	3.2
8	0	16	0.5

TAPE — REC OUT — PLAYBACK — REC/PLAY

SPEAKERS — (Rch) MAIN REMOTE — (Lch) MAIN REMOTE

Q705 2SD880

T701 (Power transformer)

AC 220V (50/60Hz)

(Blue) (Blue) (Black) (Black) (Black) (White) (White) (Red) (Brown)

PL1 12V 0.22A (DIAL indicator)

PL2 12V 0.22A (TUNING indicator)

Q706 2SD880

Q701, 702 2SA1015

Q703 2SC1685

Q704 2SA1015

F1 250V T800mA

F2 250V T315mA

S10 POWER

VOLUME — BALANCE — FM MUTING / MODE — LOUDNESS — TREBLE — BASS — REMOTE — MAIN — SPEAKERS — HEADPHONES

Q101 2SC1685 — Q102 2SC1685 — Q103, 104 2SC1685 — Q601, 602 2SA992

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- **Terminal guide of transistors, IC's and diodes**

2SK195 (Gate, Source, Drain)

2SC1047, 2SC1685, 2SC1675, 2SA992, 2SA1015, 2SC1815 (E, C, B)

SVINJM4562DD

2SD880 (B, C, E)

AN278

AN7273

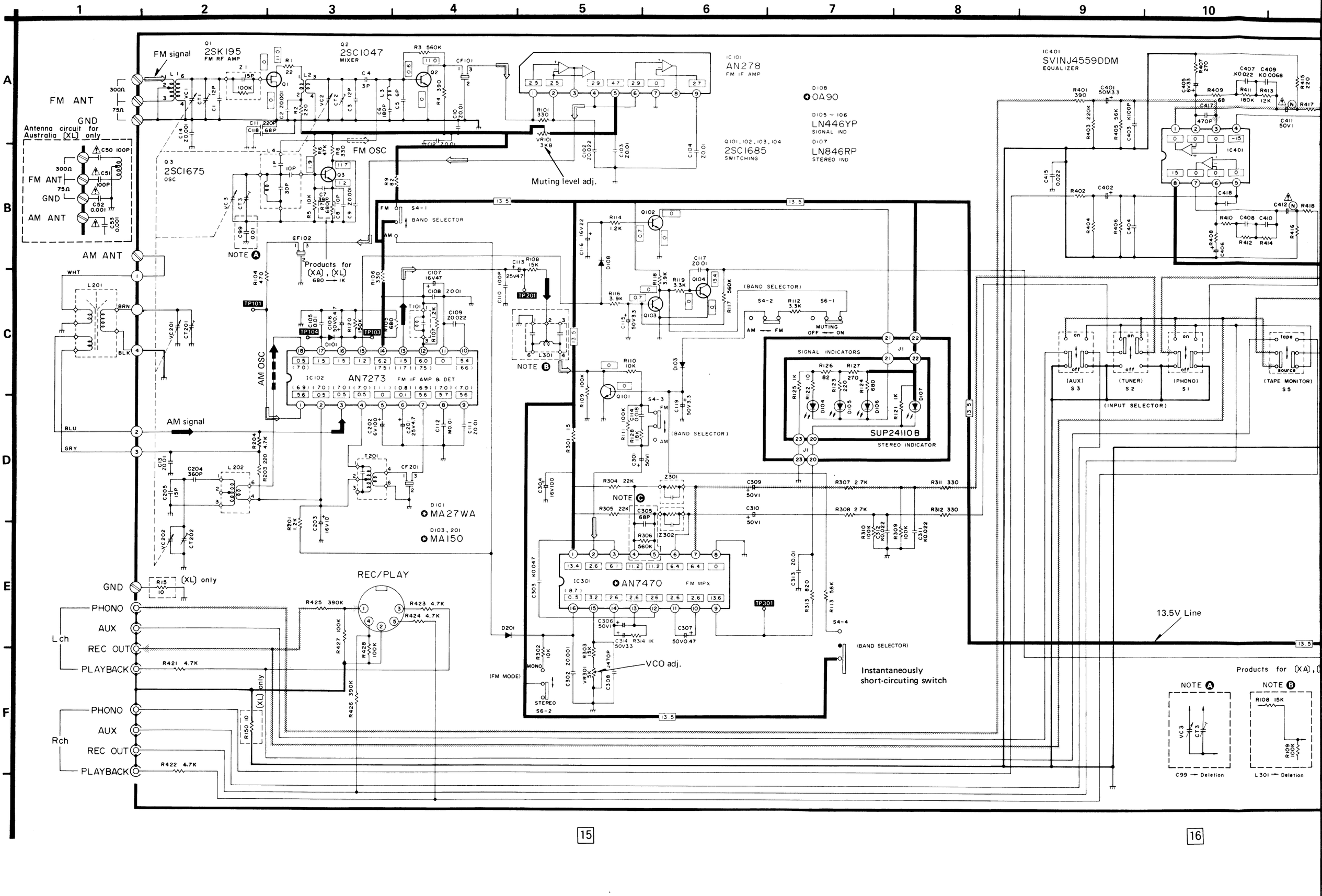
AN7470

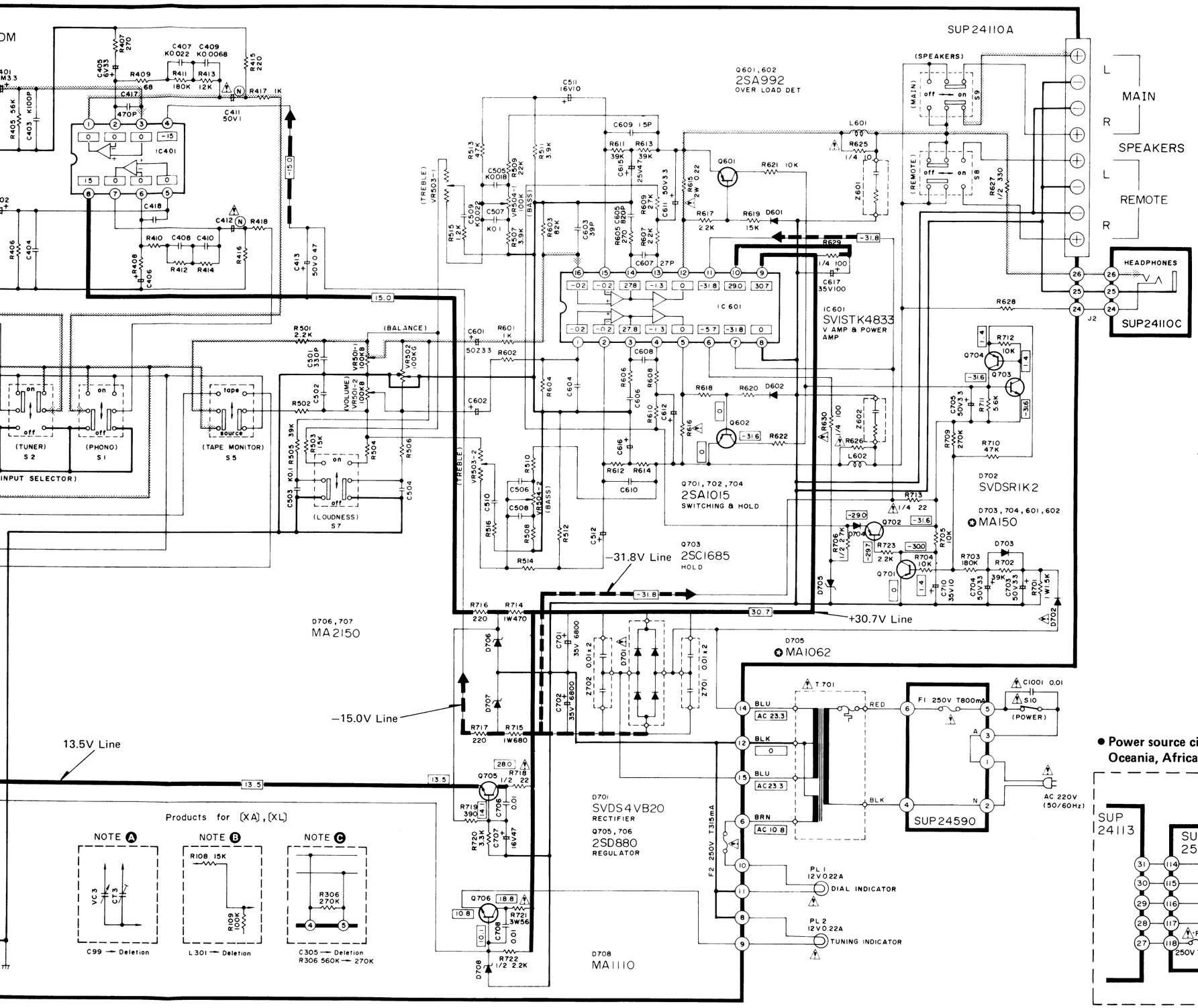
SVISTK4833M

LN446YP (Amber) LN846RP (Orange) (A, K)

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)



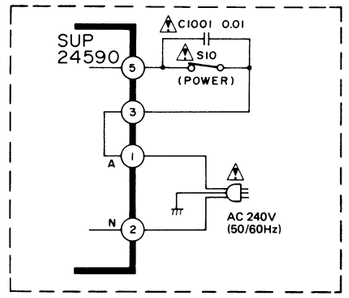


Notes:

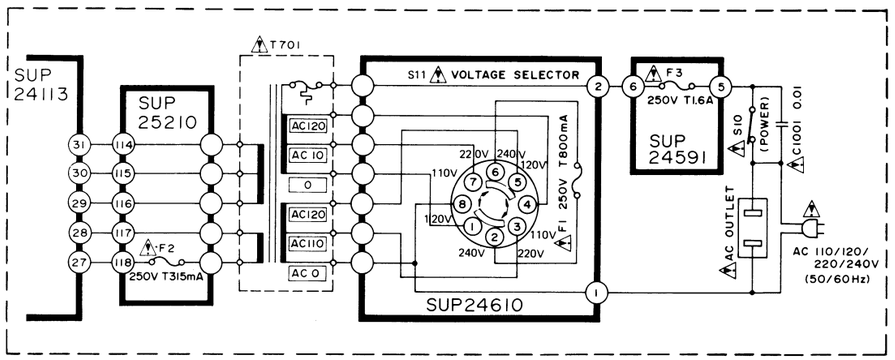
* **The part No. of transistors, IC and diodes mentioned in schematic diagram stand for production Part No.**
Regarding the Part No. without ✪ mark, the production Part No. are different from the replacement Part No.
Therefore, when placing an order for replacement parts, please use the Part No. in the replacement parts list.

1. **S1 ~ S3** : Input selector switch in "**tuner**" position.
   phono (S1) ⟷ tuner (S2) ⟷ aux (S3)
2. **S4-1 ~ S4-4** : Band selector switch in "**FM**" position.
   FM ⟷ AM
3. **S5** : Tape monitor switch in "**source**" position.
   source ⟷ tape
4. **S6-1, S6-2** : FM muting/mode switch in "**on/FM auto**" position.
   on/FM auto ⟷ off/FM mono
5. **S7** : Loudness switch in "**off**" position.
   off ⟷ on
6. **S8** : Main speaker switch in "**on**" position.
   off ⟷ on
7. **S9** : Remote speaker switch in "**off**" position.
   off ⟷ on
8. **S10** : Power source switch in "**on**" position.
9. **S11** (XA)only : Voltage selector switch in "**240V**" position.
   110V ⟷ 120V ⟷ 220V ⟷ 240V
10. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard.
    Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
    * Figures in [ ] standard for DC voltage in FM signal reception mode.
    * Figures in ( ) standard for DC voltage in AM signal reception mode.
11. ⟹ FM signal lines. ➡ AM signal lines.
    ⋯▷ AF signal lines. ➡ Positive voltage lines.
12. Important safety notice:
    Componetns identified by ⚠ mark have special characteristics important for safety.
    When replacing any of these components, use only manufacturer's specified parts.

● **Power source circuit for Australia [XL].**



● **Power source circuit for Southeast Asia, Oceania, Africa, Middle Near East and Central South America [XA].**

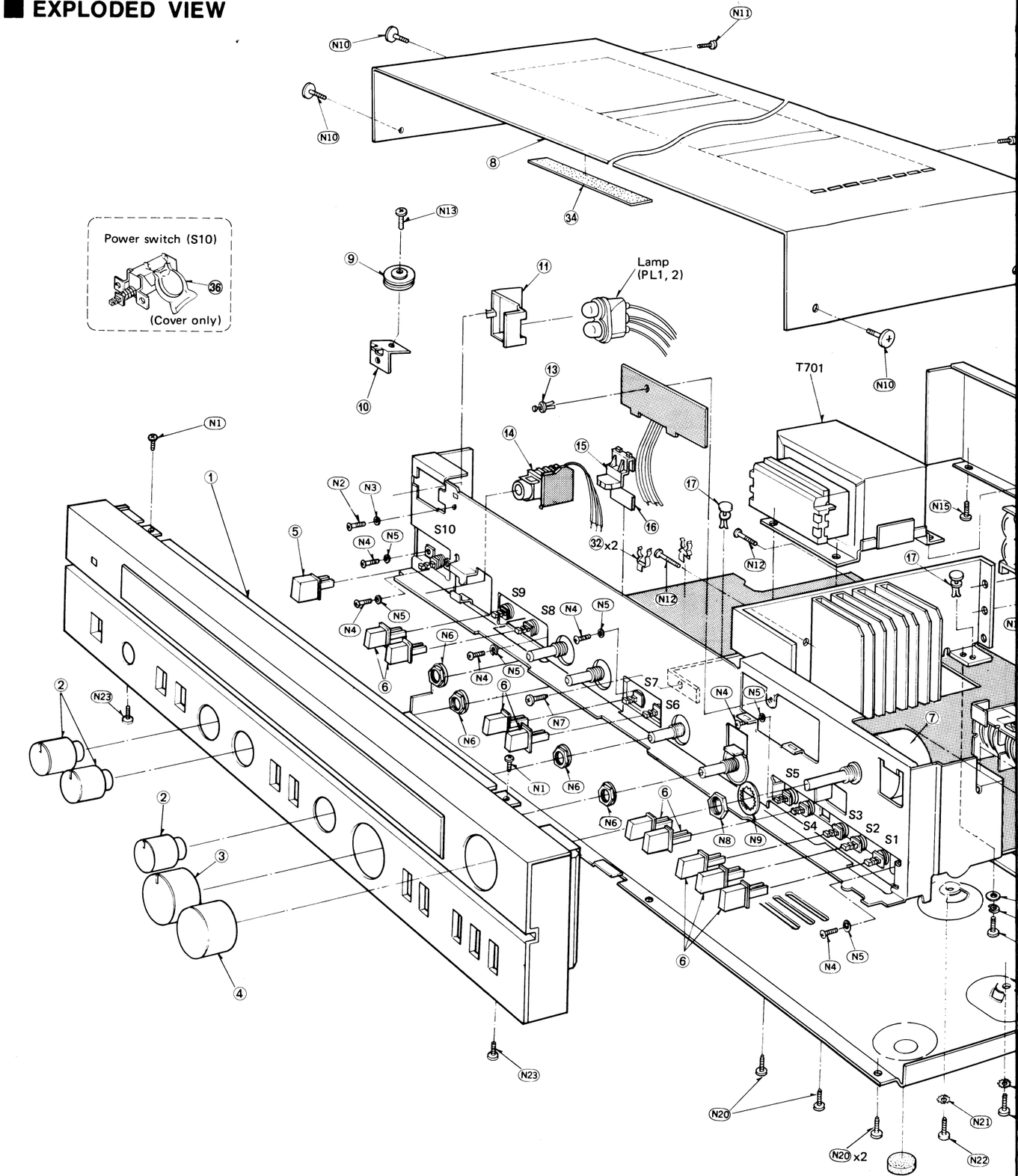


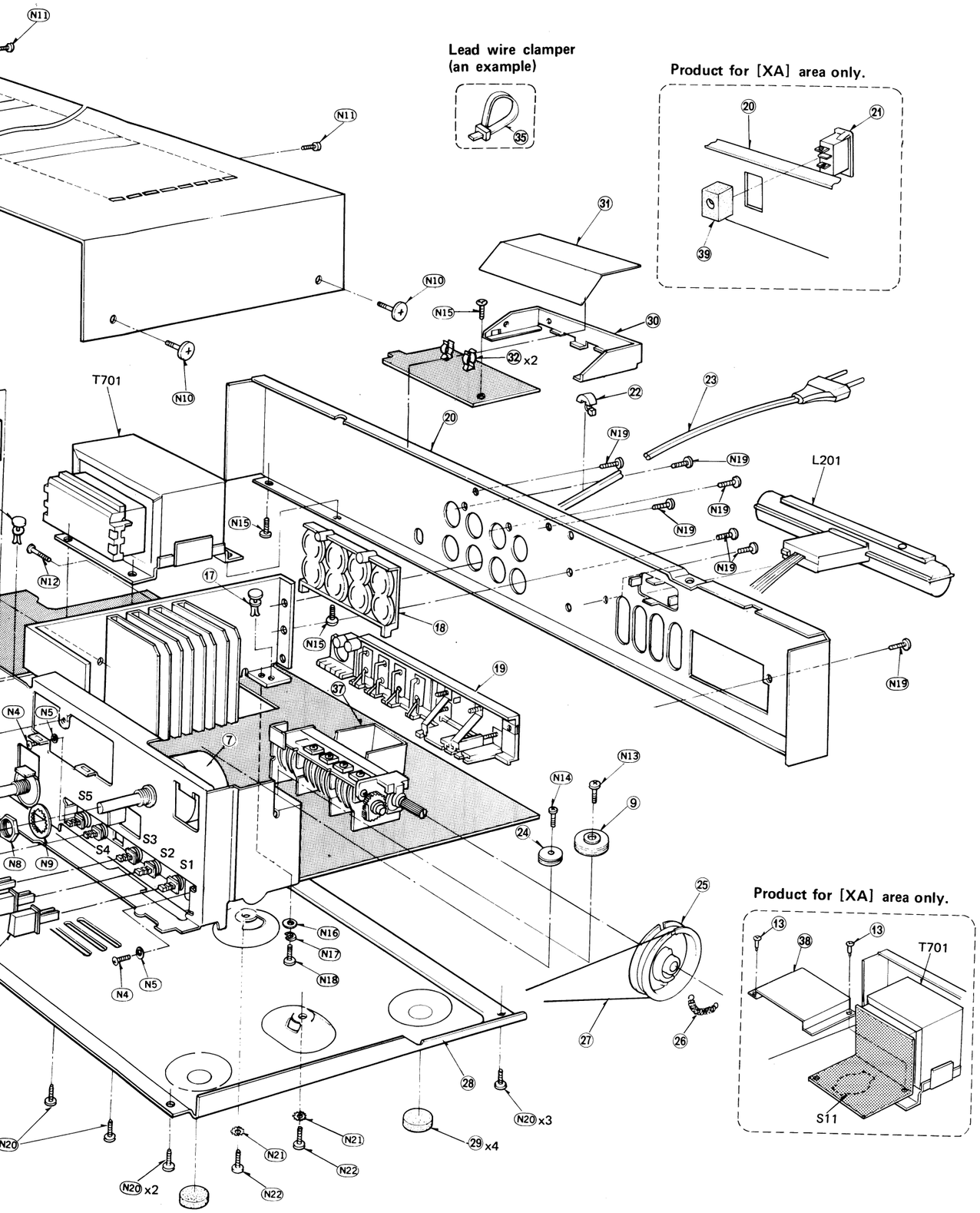
Continued from page 11.

Ref. No.		Part No.	Part Name & Description
R110	S	ERD25FJ103	Carbon, 1/4W, 10kΩ, ±5%
R111	S	ERD25TJ104	Carbon, 1/4W, 100kΩ, ±5%
R112	S	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ±5%
R113	S	ERD25FJ562	Carbon, 1/4W, 5.6kΩ, ±5%
R114	S	ERD25FJ122	Carbon, 1/4W, 1.2kΩ, ±5%
R116	S	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ±5%
R117	S	ERD25TJ564	Carbon, 1/4W, 560kΩ, ±5%
R118	S	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ±5%
R119	S	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ±5%
R120	S	ERD25TJ154	Carbon, 1/4W, 150kΩ, ±5%
R121	S	ERD25FJ102	Carbon, 1/4W, 1kΩ, ±5%
R122	S	ERD25FJ100	Carbon, 1/4W, 10Ω, ±5%
R123	S	ERD25FJ271	Carbon, 1/4W, 270Ω, ±5%
R124	S	ERD25FJ681	Carbon, 1/4W, 680Ω, ±5%
R125	S	ERD25FJ102	Carbon, 1/4W, 1kΩ, ±5%
R126	S	ERD25FJ820	Carbon, 1/4W, 82Ω, ±5%
R127	S	ERD25FJ221	Carbon, 1/4W, 220Ω, ±5%
R128	S	ERD25TJ183	Carbon, 1/4W, 18kΩ, ±5%
R150, 151 [XL] only	S	ERD25FJ100	Carbon, 1/4W, 10Ω, ±5%
R201	S	ERD25FJ122	Carbon, 1/4W, 1.2kΩ, ±5%
R203	S	ERD25FJ221	Carbon, 1/4W, 220Ω, ±5%
R204	S	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ±5%
R301	S	ERD25FJ150	Carbon, 1/4W, 15Ω, ±5%
R302	S	ERD25FJ103	Carbon, 1/4W, 10kΩ, ±5%
R303	S	ERD25TJ153	Carbon, 1/4W, 15kΩ, ±5%
R304, 305	S	ERD25TJ223	Carbon, 1/4W, 22kΩ, ±5%
R306 [EX, EH]	S	ERD25TJ564	Carbon, 1/4W, 560kΩ, ±5%
R306 [XA, XL]	S	ERD25TJ274	Carbon, 1/4W, 270kΩ, ±5%
R307, 308	S	ERD25FJ272	Carbon, 1/4W, 2.7kΩ, ±5%
R309, 310	S	ERD25TJ104	Carbon, 1/4W, 100kΩ, ±5%
R311, 312	S	ERD25FJ331	Carbon, 1/4W, 330Ω, ±5%
R313	S	ERD25FJ821	Carbon, 1/4W, 820Ω, ±5%
R314	S	ERD25FJ102	Carbon, 1/4W, 1kΩ, ±5%
R401, 402	S	ERD25FJ391	Carbon, 1/4W, 390Ω, ±5%
R403, 404	S	ERD25TJ224	Carbon, 1/4W, 220kΩ, ±5%
R405, 406	S	ERD25TJ563	Carbon, 1/4W, 56kΩ, ±5%
R407, 408	S	ERD25FJ271	Carbon, 1/4W, 270Ω, ±5%
R409, 410	S	ERD25FJ680	Carbon, 1/4W, 68Ω, ±5%
R411, 412	S	ERD25TJ184	Carbon, 1/4W, 180kΩ, ±5%
R413, 414	S	ERD25TJ123	Carbon, 1/4W, 12kΩ, ±5%
R415, 416	S	ERD25TJ224	Carbon, 1/4W, 220kΩ, ±5%
R417, 418	S	ERD25FJ102	Carbon, 1/4W, 1kΩ, ±5%
R421, 422	S	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ±5%
R423, 424	S	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ±5%
R425, 426	S	ERD25TJ394	Carbon, 1/4W, 390kΩ, ±5%
R501, 502	S	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ±5%
R503, 504	S	ERD25TJ153	Carbon, 1/4W, 15kΩ, ±5%
R505, 506	S	ERD25TJ393	Carbon, 1/4W, 39kΩ, ±5%
R507, 508	S	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ±5%
R509, 510	S	ERD25TJ223	Carbon, 1/4W, 22kΩ, ±5%
R511, 512	S	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ±5%
R513, 514	S	ERD25TJ473	Carbon, 1/4W, 47kΩ, ±5%
R515, 516	S	ERD25FJ122	Carbon, 1/4W, 1.2kΩ, ±5%
R601, 602	S	ERD25FJ102	Carbon, 1/4W, 1kΩ, ±5%
R603, 604	S	ERD25TJ823	Carbon, 1/4W, 82kΩ, ±5%
R605, 606	S	ERD25FJ271	Carbon, 1/4W, 270Ω, ±5%
R607, 608	S	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ±5%
R609, 610	S	ERD25FJ272	Carbon, 1/4W, 2.7kΩ, ±5%
R611, 612	S	ERD25TJ393	Carbon, 1/4W, 39kΩ, ±5%
R613, 614	S	ERD25TJ393	Carbon, 1/4W, 39kΩ, ±5%
R615, 616	⚠	ERX2ANJR22	Metl Film, 2W, 0.22Ω, ±5%
R617, 618	S	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ±5%
R619, 620	S	ERD25TJ153	Carbon, 1/4W, 15kΩ, ±5%
R621, 622	S	ERD25FJ103	Carbon, 1/4W, 10kΩ, ±5%
R625, 626	S ⚠	ERD25FJ100	Carbon, 1/4W, 10Ω, ±5%
R627, 628	⚠	ERDS1FJ331	Carbon, 1/2W, 330Ω, ±5%
R629, 630	S ⚠	ERD25FJ101	Carbon, 1/4W, 100Ω, ±5%
R701	S	ERG1ANJ152	Metal Oxide, 1W, 1.5kΩ, ±5%
R702	S	ERD25TJ393	Carbon, 1/4W, 39kΩ, ±5%
R703	S	ERD25TJ184	Carbon, 1/4W, 180kΩ, ±5%
R704, 705	S	ERD25FJ103	Carbon, 1/4W, 10kΩ, ±5%
R706	⚠	ERDS1FJ272	Carbon, 1/2W, 2.7kΩ, ±5%
R709	S	ERD25TJ274	Carbon, 1/4W, 270kΩ, ±5%
R710	S	ERD25TJ473	Carbon, 1/4W, 47kΩ, ±5%
R711	S	ERD25FJ562	Carbon, 1/4W 5.6kΩ, ±5%
R712	S	ERD25FJ103	Carbon, 1/4W, 10kΩ, ±5%
R713	S ⚠	ERD25FJ220	Carbon, 1/4W, 22Ω, ±5%
R714	S	ERG1ANJ471	Metal Oxide, 1W, 470Ω, ±5%
R715	S	ERG1ANJ681	Metal Oxide, 1W, 680Ω, ±5%
R716, 717	S	ERD25FJ221	Carbon, 1/4W, 220Ω, ±5%
R718	⚠	ERDS1FJ220	Carbon, 1/2W, 22Ω, ±5%
R719	S	ERD25FJ391	Carbon, 1/4W, 390Ω, ±5%

Ref. No.		Part No.	Part Name & Description
R720	S	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ±5%
R721	⚠	ERG3ANJ560	Metal Oxide, 3W, 56Ω, ±5%
R722	⚠	ERDS1FJ222	Carbon, 1/2W, 2.2kΩ, ±5%
R723	S	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ±5%
CAPACITORS			
C1	S	ECCD1H120KC	Ceramic, 50V, 12pF, ±10%
C2	S	ECKD1H102ZF	Ceramic, 50V, 0.001μF, +80 −20 %
C3	S	ECCD1H120KC	Ceramic, 50V, 12pF, ±10%
C4	S	ECCD1H030CC	Ceramic, 50V, 3pF, ±0.25pF
C5	S	ECCD1H060CC	Ceramic, 50V, 6pF, ±0.25pF
C6	S	ECCD1H181K	Ceramic, 50V, 180pF, ±10%
C7	S	ECCD1H390KC	Ceramic, 50V, 39pF, ±10%
C8	S	ECCD1H100KC	Ceramic, 50V, 10pF, ±10%
C9	S	ECKD1H102ZF	Ceramic, 50V, 0.001μF, +80 −20 %
C10	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C11	S	ECKD1H221KB	Ceramic, 50V, 220pF, ±10%
C12 ~ 14	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C50, 51 [XL] only	⚠	ECKDHS101MB	Ceramic, 400VAC, 100pF, ±20%
C52, 53 [XL] only	⚠	ECKDHS102MD	Ceramic, 400VAC, 0.001μF, ±20%
C99 [EX, EH] only	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C102	S	ECKD1H223ZF	Ceramic, 50V, 0.022μF, +80 −20 %
C103 ~ 105	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C106	S	ECEA50ZR47	Electrolytic, 50V, 0.47μF
C107	S	ECEA1ES470	Electrolytic, 25V, 47μF
C108	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C109	S	ECKD1H223ZF	Ceramic, 50V, 0.022μF, +80 −20 %
C110	S	ECCD1H101K	Ceramic, 50V, 100pF, ±10%
C111	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C112	S	ECKD1H103MD	Ceramic, 50V, 0.01μF, ±20%
C113	S	ECEA25Z4R7	Electrolytic, 25V, 4.7μF
C114	S	ECQM1H183JZ	Polyester, 50V, 0.018μF, ±5%
C115	S	ECEA50Z3R3	Electrolytic, 50V, 3.3μF
C116	S	ECEA1ES220	Electrolytic, 25V, 22μF
C117	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C118	S	ECCD1H680K	Ceramic, 50V, 68pF, ±10%
C119	S	ECEA50Z3R3	Electrolytic, 50V, 3.3μF
C201	S	ECEA25Z4R7	Electrolytic, 25V, 4.7μF
C202	S	ECEA1AS101	Electrolytic, 10V, 100μF
C203	S	ECEA1HS100	Electrolytic, 50V, 10μF
C204		ECQP1361JZ	Polyester, 125V, 360pF, ±5%
C205	S	ECCD1H150KC	Ceramic, 50V, 15pF, ±10%
C301	S	ECEA50Z1	Electrolytic, 50V, 1μF
C302	S	ECKD1H102ZF	Ceramic, 50V, 0.001μF, +80 −20 %
C303	S	ECQM1H473JZ	Polyester, 50V, 0.047μF, ±5%
C304	S	ECEA1ES101	Electrolytic, 25V, 100μF
C305 [EX, EH] only	S	ECCD1H680K	Ceramic, 50V, 68pF, ±10%
C306	S	ECEA50Z1	Electrolytic, 50V, 1μF
C307	S	ECEA50ZR47	Electrolytic, 50V, 0.47μF
C308		ECQP1471JZ	Polyester, 125V, 470pF, ±5%
C309, 310	S	ECEA50Z1	Electrolytic, 50V, 1μF
C311, 312	S	ECQM1H223JZ	Polyester, 50V, 0.022μF, ±5%
C313	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C314	S	ECEA50Z3R3	Electrolytic, 50V, 3.3μF
C401, 402	S	ECEA50M3R3R	Electrolytic, 50V, 3.3μF
C403, 404	S	ECCD1H101K	Ceramic, 50V, 100pF, ±10%
C405, 406	S	ECEA1CS330	Electrolytic, 16V, 33μF
C407, 408	S	ECQM1H223JZ	Polyester, 50V, 0.022μF, ±5%
C409, 410	S	ECQM1H682JZ	Polyester, 50V, 0.0068μF, ±5%
C411, 412	⚠	ECEA1HN010S	Non-Polar Electrolytic, 50V, 1μF
C413	S	ECEA50ZR47	Electrolytic, 50V, 0.47μF
C415	S	ECKD1H223ZF	Ceramic, 50V, 0.022μF, +80 −20 %
C417, 418	S	ECKD1H471KB	Ceramic, 50V, 470pF, ±10%
C501, 502	S	ECKD1H331KB	Ceramic, 50V, 330pF, ±10%
C503, 504	S	ECQM1H104JZ	Polyester, 50V, 0.1μF, ±5%
C505, 506	S	ECQM1H183JZ	Polyester, 50V, 0.018μF, ±5%
C507, 508	S	ECQM1H104JZ	Polyester, 50V, 0.1μF, ±5%
C509, 510	S	ECQM1H223JZ	Polyester, 50V, 0.022μF, ±5%
C511, 512	S	ECEA1HS100	Electrolytic, 50V, 10μF
C601, 602	S	ECEA50Z3R3	Electrolytic, 50V, 3.3μF
C603, 604	S	ECCD1H390K	Ceramic, 50V, 39pF, ±10%
C605, 606	S	ECKD1H821KB	Ceramic, 50V, 820pF, ±10%
C607, 608	S	ECCD1H270K	Ceramic, 50V, 27pF, ±10%
C609, 610	S	ECCD1H1R5CC	Ceramic, 50V, 1.5pF, ±0.25pF
C611, 612	S	ECEA50Z3R3	Electrolytic, 50V, 3.3μF
C615, 616	S	ECEA25Z4R7	Electrolytic, 25V, 4.7μF
C617	S	ECEA1VS101	Electrolytic, 35V, 100μF
C701, 702		ECETS1VV472U	Electrolytic, 35V, 4700μF
C703, 704	S	ECEA1JS330	Electrolytic, 63V, 33μF
C705	S	ECEA50Z3R3	Electrolytic, 50V, 3.3μF
C706	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C707	S	ECEA1ES470	Electrolytic, 25V, 47μF
C708	S	ECKD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
C710	S	ECEA1HS100	Electrolytic, 50V, 10μF
C1001	⚠	ECKDKC103PF	Ceramic, 250VAC, 0.01μF

■ EXPLODED VIEW





■ REPLACEMENT PARTS LIST .... Cabinet & Chassis Parts

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components use only manufacturer's specified parts.
3. K -marked parts are used for black only, while O- marked parts are for silver type only.
4. Parts other than K -and O-marked are used for both black and silver types.
5. The "S" mark is service standard parts and may differ from production parts.
6. Bracked indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

Black type model No. : SA-104 (K)

Areas
* [EX] is available in Switzerland and Scandinavia.
* [EH] is available in Holland.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.

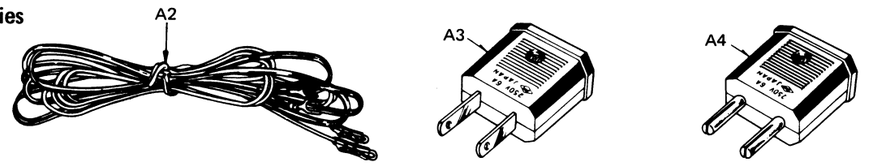
Ref. No.		Part No.	Part Name & Description
CABINET and CHASSIS PARTS			
1	O	SYWA104M	Front Panel Ass'y (Silver)
	JPN		(Made in Japan)
1	K	SYWA104KEX	Front Panel Ass'y (Black)
	MSA		(Made in Singapore)
2		SBN1103	Knob, Bass, Treble & Balance
3		SBN1105	Knob, Volume
4		SBN1107	Knob, Tuning
5		SBC337–1	Button, Power
6		SBC339	Buttton, Speakers, Loudness, FM muting /mode, Tape Monitor, Band Selector & Input Selector
7		SDT8095–1	Shaft, Tuning
8	O	SKC890S1	Cabinet (Silver)
8	K	SKC890BB1	Cabinet (Black)
9		RDR8–1	Pulley, Dial
10		SUR143	Bracket, Pully
11		SMP325	Bracket, Lamp
13		SHR401–1	Latch, LED P.C.B. & Cover
14		SJJ69–1	Jack, Headphone
15		SDP1167	Pointer, Dial
16		SHP59	Slider, Pointer
17		SHR411	Latch, Heat-sink
18		SJF4815	Terminal, Speakers
19		SJF8035–1N	Terminal, Input & Antenna
19 [XL] only		SJF8035–5N	Terminal, Input & Antenna
20 [EX, EH]	MSA	SGP2910–1A	Rear Panel (Made in Singapore)
20 [XA]	JPN	SGP2910–3A	Rear Panel (Made in Japan)
20 [XL]	JPN	SGP2910–4A	Rear Panel (Made in Japan)
21 [XA] only	⚠	SJS9221	Socket, AC Outlet
22		SHR127	Bushing, AC Cord
22 [XL] only		SHR131	Bushing, AC Cord
23	S ⚠	SJA88	AC Cord, Power Source
23	S ⚠	QFC1207M	AC Cord, Power Source
24		SDR3	Pulley, Dial
25		SDD38–1	Drum, Variable Capacitor
26		SDSA4121	Spring, Drum
27		SDZ051–2	Cord, Dial (1.8m)
28		SYUA104EX	Bottom Board, W/Feet
28 [XA] only		SYUA104XA	Bottom Board, W/Feet
29		SKL245–2	Foot, Set
30		SMN1823	Bracket, Fuse PCB
31		SMX435	Cover, AC Outlet
32		SJT347	Clip, Fuse
34		SHS6111–1	Fiber, Cabinet
35		SHR301	Clamper, Lead Wire
36		SMXA65	Cover, Line Capacitor
37		SMC469–2	Cover, Shield
38 [XA] only		SMX611	Cover, Voltage Adjuster PCB
39 [XA] only		SMX13–1	Cover, AC Outlet

Ref. No.		Part No.	Part Name & Description
SCREWS, NUTS and WASHERS			
N1	S	XTS3+8BFZ	Screw, Front Panel, ⊕ 3x8
N2	S	XSN3+6SFZ	Screw, Pulley Bracket, ⊕ 3x6
N3	S	XWA3BFZ	Washer, Pulley Bracket, φ3
N4	S	XSN3+6S	Screw, Switches, ⊕ 3x6
N5	S	XWA3B	Washer, Switches, φ3
N6		SNE4021–1	Nut, Variable Resistors, M8
N7		XTBS3+8BFZ1	Screw, Heat Sink, ⊕ 3x8
N8	S	XNS11	Nut, Tuning Shaft, M11
N9	S	XWD11B	Washer, Tuning Shaft, φ11
N10	O	SNE2095–2	Screw, Cabinet
N10	K	SNE2095–3	Screw
N11	S O	XTB3+8BFN	Screw, Cabinet, ⊕ 3x8
N11	S K	XTB3+8BFZ	Screw, Cabinet, ⊕ 3x8
N12	S	XTB3+16BFZ	Screw, Power IC, ⊕ 3x16
N13		SHD3X1F–1	Screw, Pulley
N14		SHD3X21F–1	Screw, Pulley
N15	S	XTB3+8BFZ	Screw, Power Transformer, ⊕ 3x8
N16	S	XWG3E8FN	Washer, Heat-sink, φ3
N17	S	XWA3BFN	Washer, Heat-sink, φ3
N18	S	XTB3+10BFN	Screw, Heat-sink, ⊕ 3x10
N19		XTBS3+8BFZ1	Screw, Rear Panel, ⊕ 3x8
N20	S	XTB3+8BFN	Screw, Bottom Board, ⊕ 3x8
N21	S	XWC3B	Washer, Bottom Board, φ3
N22	S	XSN3+8S	Screw, Bottom Board, ⊕ 3x8
N23		XTBS3+8BFZ1	Screw, Front Panel, ⊕ 3x8
PACKING PARTS			
P1 [EX, EH]	MSA	SPG3791	Carton Box, (Made in Singapore)
P1 [XA]	JPN	SPG3793	Carton Box, (Made in Japan)
P1 [XL]	JPN	SPG3795	Carton Box, (Made in Japan)
P2 [EX, EH]	O	SGK1411	Label, (Silver Type) only
P3		SPS3515	Pad, Left Side
P3 [XL] only		SPS3515–1	Pad, Left Side
P4		SPS3517	Pad, Right Side
P4 [XL] only		SPS3517–1	Pad, Right Side
P5		SPP699	Polyethylene Bag
ACCESSORIES			
A1 [EX, EH]		SQF11187	Instructions Book, Printed Matter
A1 [XA]		SQF11189	Instructions Book, Printed Matter
A1 [XL]		SQF11193	Instructions Book, Printed Matter
A2		SSA267	Cord, FM Indoor Antenna
A3 [XA] only	⚠	SJP5213–1	Plug Adaptor, Power Source
A4 [XA] only	⚠	SJP5215	Plug Adaptor, Power Source

* We have a two production country for this model.
One of a made by Japan and other one is made by Singapore.
The made by Singapore unit was we has different parts number.

JPN: Made in Japan
MSA: Made in Singapore

• **Accessories**



Printed in Japan
82034600 ⊗ TK

ORDER NO. SD82032134C8–A

FM/AM Stereo Receiver SA-104/SA-104(K)

This booklet contains the specifications and adjusting procedures for SA-104, written in Germany, Franch and Spanish.
File this manual together with the SA-104 service manual (Order No. SD82032134C8).

DEUTSCH

DEUTSCH

■ TECHNISCHE DATEN (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 40 Hz ~ 20 kHz	
beide Kanäle ausgesteuert	2 × 20W (4 Ω)
	2 × 20W (8 Ω)
Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz	
beide Kanäle ausgesteuert	2 × 20W (4 Ω)
	2 × 20W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz	
beide Kanäle ausgesteuert	2 × 24W (4 Ω)
	2 × 22W (8 Ω)
Gesamtklirrfaktor	
Nennleistung bei 40 Hz ~ 20 kHz	0,08% (4 Ω)
	0,04% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz	0,08% (4 Ω)
	0,04% (8 Ω)
Nennleistung bei 1 kHz	0,04% (4 Ω)
	0,04% (8 Ω)
halbe Nennleistung bei 1 kHz	0,009% (8 Ω)
−26 dB Leistung bei 1 kHz	0,1% (4 Ω)
50 mW Leistung bei 1 kHz	0,12% (4 Ω)
Intermodulationsfaktor	
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω	0,08%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,04%
Leistungsbandbreite	
beide Kanäle ausgesteuert bei −3 dB	10 Hz ~ 30 kHz (4 Ω)
Dämpfungsfaktor	15 (4 Ω), 30 (8 Ω)
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
Aux	150 mV/22 kΩ
Tape	150 mV/22 kΩ
Tape Aufnahme/Wiedergabe (TAPE REC/PLAY)	180 mV/22 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	150 mV
Geräuschabstand	
Nennleistung (4 Ω)	
Phono	70 dB (nach IHF, A: 73 dB)
Aux, Tape	88 dB (nach IHF, A: 95 dB)
−26 dB Leistung (4 Ω)	
Phono	64 dB
Aux, Tape	66 dB
50 mW Leistung (4 Ω)	
Phono	62 dB
Aux, Tape	62 dB
Phono	RIAA-Standardkurve ±0,8 dB (30 Hz ~ 15 kHz)
Aux, Tape	7 Hz ~ 70 kHz(−3 dB)
Klangregler	
Baßregler (BASS)	50 Hz, +10 dB ~ −10 dB
Höhenregler (TREBLE)	20 kHz, +10 dB ~ −10 dB
Gehörrichtige Lautstärkekorrektur (Loudness)	
(bei −30 dB Ausgangsleistung)	50 Hz, +9 dB
Ausgangsspannung und -impedanz	
Tape Aufnahme (TAPE REC OUT)	150 mV
Tape Aufnahme/Wiedergabe (TAPE REC/PLAY)	30 mV/82 kΩ
Kanalabweichung (Aux, 250 Hz ~ 6300 Hz)	±1 dB
Übersprechdämpfung (Aux, 1 kHz)	55 dB
Kopfhörerpegel und -impedanz	210 mV/330 Ω
Lautsprecherimpedanz	
MAIN oder REMOTE	4 Ω ~ 16 Ω
MAIN und REMOTE	8 Ω ~ 16 Ω

■ UKW-TUNERTEIL

Wellenbereich	87,5 ~ 108 MHz
Eingangsempfindlichkeit	
S/R 30 dB	1,9 μV (300 Ω), 1,3 μV (75 Ω)
S/R 26 dB	1,7 μV (300 Ω), 1,2 μV (75 Ω)
S/R 20 dB	1,5 μV (300 Ω), 0,9 μV (75 Ω)
Nutzempfindlichkeit nach IHF	1,9 μV (nach IHF '58)
Stereoumschaltschwelle bei 46 dB nach IHF	22 μV/75 Ω
Gesamtklirrfaktor	
Mono	0,15%
Stereo	0,3%
Geräuschabstand	
Mono	60 dB (77 dB nach IHF)
Stereo	58 dB (70 dB nach IHF)
Frequenzgang	20 Hz ~ 15 kHz (+1 dB ~ −2 dB)
Trennschärfe bei Störsender	60 dB
Einfangverhältnis	1,0 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	55 dB
ZF-Dämpfung bei 98 MHz	70 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	80 dB
AM-Unterdrückung	50 dB
Übersprechdämpfung	
1 kHz	40 dB
10 kHz	30 dB
Trägerrest	
19 kHz	−35 dB (−35 dB nach IHF)
38 kHz	−50 dB (−50 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±1,5 dB
Begrenzereinsatz	1,2 μV
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	300 Ω (symmetrisch) 75 Ω (unsymmetrisch)

■ AM-TUNERTEIL

Wellenbereiche	525 ~ 1605 kHz
Eingangsempfindlichkeit (S/R 20 dB)	30 μV, 300 μV/m
Trennschärfe	27 dB
Spiegelfrequenz-Dämpfung bei 1000 kHz	45 dB
ZF-Dämpfung bei 1000 kHz	55 dB

■ ALLGEMEINE DATEN

Leistungsaufnahme	210 W
Netzspannung	Wechselstrom 50 Hz/60 Hz, 220V (Für Kontinentaleuropa)
	Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V (Für andere Länder)
Abmessungen (B×H×T)	430 × 97 × 260 mm
Gewicht	5,4 kg

■ MESSUNGEN UND JUSTIERUNGEN

AM (MW)-EINSTELLUNG

• Einstellungen und zu benutzende Geräte
1. Elektronische Röhrenvoltmeter für Wechsel-und Gleichstrom (VTVM).
2. AM (MW)-Meßsender.
3. Oszilloskop.
4. Die Netzspannung auf ihrem Sollwert halten.
5. Der Ausgang des Meßsenders darf nicht höher sein als notwendig für eine gute Ablesung.
6. Die AM-Ferritstabantenne (L201) herausziehen.
7. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.

	AM/UKW MESSENDER		ANZEIGE-FREQUENZ DURCH VOREIN-STELLUNG	VORBEREITUNG	ABGLEICHS-PUNKTE	ABGLEICHSVERFAHREN
	ANSCHLUSS	FREQUENZ				
	MW-HF-ABGLEICH					
1	Einen MW-Signal-generator über einen 200pF-Kondensator mit dem MW-Anten-neneingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	600kHz (400Hz Modulat., 30%)	600kHz	Wechselstrom Röhrenvoltmeter oder Oszillograph über den Ausgang "SPEAKER" anschließen.	L202 (AM OSC Spule) L201 (AM ANT Spule)	1. Auf max. Ausgang abgleichen. 2. L201 (Spule) wird abgeglichen, indem die Spule am Ferritstab entlanggeschoben wird.
2		1500kHz (400Hz Modulat., 30%)	1500kHz	Wechselstrom Röhrenvoltmeter oder Oszillograph über den Ausgang "SPEAKER" anschließen.	CT202 (AM OSC Trimmer) CT201 (AM ANT Trimmer)	1. Auf max. Ausgang abgleichen. 2. Schritte (1) und (2) sind zu wiederholen.

FM (UKW)-EINSTELLUNG

• Verwendete Einrichtungen
1. UKW-Meßsender.
2. Stereo-Modulator (oder Trennmesser).
3. Oszilloskop.
4. Elektronische Röhrenvoltmeter für Wechsel-und Gleichstrom (VTVM).
5. Signalfrequenzmesser (verwendbar für 19kHz und 108MHz).
6. UKW-300-Ohm-Kunstantenne.

• Vorbereitung UKW-Meßsender.
1. Stereo-Modulator an UKW-Meßsender anschließen.
2. Meßsender-Ausgang über 300-Ohm-UKW-Kunstantenne an den Antenneneingang des Gerätes anschließen.
3. Der normale Eingang des Gerätes beträt 60dB (1mV), 400Hz, 100% Modulation. (Wegen Verwendung der Kunstantenne muß der Signalausgang 12dB plus (IHF) sein; d.h. beim Eingang von 60dB soll der Signalausgang 72dB sein.)

• Zustand des Gerätes
1. Den Wellenbereichsschalter auf die "FM"-Position stellen.
2. UKW-Stillabstimmungs/Betriebsartenschalter auf "off/mono" einstellen.

	UKW-ZF-ABGLEICH					
3	——	Kein Signal	Kein Empfang	Ein Gleichstromr rörenvoltmeter zwischen T103 und T104 über eine Drosselspule verbinden. (Siehe Abb. 2)	T101 (Diskriminator FT)	• Den Kern von T101 so justieren, daß die gemessene Spannung im Signalzustand 0mV im 300mV Bereich beträgt.
	UKW-HF-ABGLEICH					
4	UKW-Meßsender über eine 300Ω-Kunst antenne an den UKW-Antenneneingang anschließen.	90MHz (400Hz Modulat., 100%) Schwacher Eingang.	90MHz	Oszillograph über den Ausgang "SPEAKER" anschließen.	L4 (Osc. Spule L1 (Ant. Spule) L2 (HF Det. Spule)	1. Einen schwachen Eingang geben, so daß Geräusch in der Ausgangswellenform enthalten wird. 2. So abgleichen, daß die Ausgangswellenform vertikalsymmetrisch wird. (Abb. 11) 3. Die Einteilung von (4) und 5) wiederholen, bis die Frequenz mit der Skala übereinstimmt.
5		106MHz (400Hz Modulat., 100%) Schwacher Eingang.	106MHz	Oszillograph über den Ausgang "SPEAKER" anschließen.	CT3 (Osc. Trimmer) CT1 (Ant. Trimmer) CT2 (HF Det. Trimmer)	

	AM/UKW MESSENDER		ANZEIGE-FREQUENZ DURCH VOREIN-STELLUNG	VORBEREITUNG	ABGLEICHS-PUNKTE	ABGLEICHSVERFAHREN
	ANSCHLUSS	FREQUENZ				
	UKW-MUTING-ABGLEICH					
6	UKW-Meßsender über eine 300Ω-Kunstantenne an den UKW-Antenneneingang anschließen. Meßsender auf 21dB einstellen.	100MHz (400Hz Modulat., 100%)	100MHz	Wechselstrom-Röhrenvoltmeter oder Oszilloskop über den Ausgang "SPEAKER" anschließen.	VR101 (Stummabstimm-pegel)	1. Den UKW-Stillabstimmungs-/Betriebsarten schalter auf "on/auto" einstellen. 2. So einstellen, daß ein Ausgang zu vernehmen ist.

	UKW-STEREO-DEKODER-ABGLEICH	
	UNTER VERWENDUNG EINES ZÄHLERS	**ALTERNATIV-MEß METHODE**
7	1. Unmoduliertes Mono-Signal 100MHz, 60dB in das Gerät speisen. 2. UKW-Stillabstimmungs-/Betriebsartenschalter auf "on/FM auto" stellen. 3. Zähler über einen Widerstand (100kΩ) an **TP301** anschließen. 4. **VR301** auf 19kHz±30Hz einstellen.	1. Ein Stereosignal in das Gerät einspeisen oder eine Stereosendung empfangen. 2. **VR301** abgleichen und den Schiebekontakt von **VR301** in der Mitte des Stereoanzeige-ON-Bereichs befestigen. (Abb. 12).

FRANÇAIS

■ CARACTERISTIQUES (Sujet á changement sans préaris.)

(DIN 45 500)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 40 Hz~20 kHz,
les deux canaux en circuit 2 × 20W (4Ω)
2 × 20W (8Ω)
Puissance de sortie continue de 40 Hz~16 kHz,
les deux canaux en circuit 2 × 20W (4Ω)
2 × 20W (8Ω)
Puissance de sortie continue à 1 kHz
les deux canaux en circuit 2 × 24W (4Ω)
2 × 22W (8Ω)
Distorsion harmonique totale
à puissance nominale (40 Hz~20 kHz) 0,08% (4Ω)
0,04% (8Ω)
à puissance nominale (40 Hz~16 kHz) 0,08% (4Ω)
0,04% (8Ω)
à puissance nominale (1 kHz) 0,04% (4Ω)
0,04% (8Ω)
à demi-puissance (1 kHz) 0,009% (8Ω)
puissance de −26 dB à 1 kHz 0,1% (4Ω)
puissance de 50 mW à 1 kHz 0,12% (4Ω)
Distorsion d'intermodulation
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω 0,08%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0,04%
Réponse de fréquences
les deux canaux en circuit, −3 dB 10 Hz~30 kHz (4Ω)
Coefficient d'amortissement 15 (4Ω), 30 (8Ω)
Sensibilité et impédance d'entrée
PHONO 2,5 mV/47kΩ
AUX (AUX) 150 mV/22kΩ
BANDE (TAPE) 150 mV/22 kΩ
BANDE ENREGISTREMENT/LECTURE (TAPE REC/PLAY) 180 mV/22kΩ
PHONO (tension d'entrée maximum, 1 kHz RMS) 150 mV
Signal/Bruit
à puissance nominale (4Ω)
PHONO 70 dB (IHF, A: 73 dB)
AUX, BANDE (AUX, TAPE) 88 dB (IHF, A: 95 dB)
puissance de −26 dB (4Ω)
PHONO 64 dB
AUX, BANDE (AUX, TAPE) 66 dB
puissance de 50 mW (4Ω)
PHONO 62 dB
AUX, BANDE (AUX, TAPE) 62 dB
PHONO Courbe nominale RIAA ±0,8 dB (30 Hz~15 kHz)
AUX, BANDE (AUX, TAPE) 7 Hz~70 kHz (−3 dB)
Réglage de la tonalité
BASSES (BASS) 50 Hz, +10 dB~ −10 dB
AIGUS (TREBLE) 20 kHz, +10 dB~ −10 dB
Compensateur physiologique (volume à −30 dB) 50 Hz, +9 dB
Tension de sortie et impédance
SORTIE ENREGISTREMENT/BANDE 1, 2 (TAPE REC OUT) 150 mV
ENREGISTREMENT/LECTURE BANDE (TAPE REC/PLAY) 30 mV/82kΩ
Equilibrage des canaux, AUX 250 Hz~6 300 Hz ±1 dB
Séparation des canaux, AUX 1 kHz 55 dB
Niveau de sortie des casques et impédance 210 mV/330Ω
Impédance de charge
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE) 4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE) 8Ω~16Ω

■ SECTION SYNTONISATEUR FM

Gamme de fréquence 87,5~108 MHz
Sensibilité
S/B 30 dB 1,9 μV (300Ω), 1,3 μV (75Ω)
S/B 26 dB 1,7 μV (300Ω), 1,2 μV (75Ω)
S/B 20 dB 1,5 μV (300Ω), 0,9 μV (75Ω)
Sensibilité utilisable IHF 1,9 μV (IHF '58)
Sensibilité stéréo au seuil de 46 dB, IHF 22 μV/75Ω
Distorsion harmonique totale
MONO 0,15%
STEREO 0,3%
Signal/Bruit
MONO 60 dB (77 dB, IHF)
STEREO 58 dB (70 dB, IHF)
Réponse de fréquence 20 Hz~15 kHz, +1 dB~ −2 dB
Sélectivité alternée par canal 60 dB
Taux de capture 1,0 dB
Rejection d'image à 98 MHz 55 dB
Rejection FI à 98 MHz 70 dB
Rejection de réponse parasite à 98 MHz 80 dB
Suppression AM 50 dB
Séparation stéréophonique
1 kHz 40 dB
10 kHz 30 dB
Fuite de porteuse
19 kHz −35 dB (−35 dB, IHF)
38 kHz −50 dB (−50 dB, IHF)
Equilibrage de canaux (250 Hz~6,300 Hz) ±1,5 dB
Point de limite 1,2 μV
Largeur de bande
Amplificateur FI 180 kHz
Démodulateur FM 1000 kHz
Bornes d'antenne 300Ω (symétrique)
75Ω (asymétrique)

■ SECTION SYNTONISATEUR AM

Gamme de fréquence 525~1605 kHz
Sensibilité (S/B 20 dB) 30 μV, 300 μV/m
Sélectivité 27 dB
Réjection d'image à 1,000 kHz 45 dB
Réjection FI à 1,000 kHz 55 dB

■ DIVERS

Consommation 210W
Alimentation CA 50 Hz/60 Hz, 220V (Pour l'Europe)
CA 50 Hz/60 Hz, 110V/120V/220V/240V (Autres)
Dimensions (L×H×Pr) 430 × 97 × 260 mm
Poids 5,4 kg

■ MESURAGES ET RÉGLAGES

RÉGLAGE DE AM

• Réglage et équipement utilisé

1. Voltmètres électroniques de courant alternatif et de courant continu (VTVM).
2. Générateur de signaux de modulation d'amplitude (AM-SG).
3. Oscilloscope.
4. Conserver la tension du secteur à la tension nominale.
5. La puissance de sortie du générateur de signaux ne doit pas être plus élevée qu'il n'est nécessaire pour obtenir une lecture de la sortie.
6. Tirer vers l'extérieur l'antenne à tige de ferrite (201) de la modulation d'amplitude.
7. Utiliser un tournevis non-métallique pour le réglage.

	GÉNÉRATEUR DE SIGNAUX AM/FM		FRÉQUENCE INDICATRICE	PRÉPARATIFS	PARTIES À RÉGLER	PROCÉDURE DE RÉGLAGE
	BRANCHEMENT	FRÉQUENCE				
	RÉGLAGE DE RF-AM					
1	Brancher le AM-SG à la borne de l'antenne AM par l'intermédiaire dún condensateur de 200pF. Commun au châssis. (Entrée faible)	600kHz (modulé à 30% avec 400Hz)	600kHz	Brancher un voltmètre électronique C.A. ou un oscilloscope aux bornes "SPEAKER".	L202 (bobine OSC) L201 (bobine ANT)	1. Réglez pour un signal de sortie maximum. 2. Régler L201 en déplaçant la bobine le long du noyau de ferrite.
2		1500kHz (modulé à 30% avec 400Hz)	1500kHz	Brancher un voltmètre électronique C.A. ou un oscilloscope aux bornes "SPEAKER".	CT202 (trimmer OSC) CT201 (trimmer ANT)	1. Réglez pour un signal de sortie maximum. 2. Répétez les étapes (1) et (2).

RÉGLAGE DE FM

• Equipment utilisé

1. Générateur de signaux de modulation de fréquence (FM-SG).
2. Modulateur stéréophonique (ou mesureur de séparation).
- . Oscilloscope.
4. Voltmètres électroniques de courant alternatif et de courant continu (VTVM).
5. Compteur de fréquence (19kHz et 108MHz mesurable).
6. Antenne fictive FM, 300 ohms.

• Préparation du générateur de signaux de modulation de fréquence (FM-SG)

1. Brancher le modulateur stéréophonique à FM-SG.
2. Applique la sortie du générateur de signaux à la borne de l'antenne de l'appareil, par l'intermédiaire de l'antenne fictive FM de 300 ohms.
3. L'entrée standard de l'appareil est de 60dB (1mV), 400Hz 100% de modulation. (A cause de l'utilisation de l'antenne fictive, la sortie SG doit être de plus 12dB (IHF). Ce qui signifie que lorsque l'entrée est de 60dB, la sortie SG doit être de 72dB.)

• Mise a u point

1. Sélecteur de gammes d'ondes....."FM".
2. Cornmutateur de mode/accord silencieux FM....."off/mono".

	RÉGLAGE DE FI-FM					
3	——	Sans signal	Point de non-interférence.	Brancher le voltmètre électronique c.c. entre les bornes T103 et T104 par l'intermédiaire de la bobine d'arrêt. (Se référer à la Fig. 10.)	T101 (Transfo. de fréq. interm. descriminatrice.)	• Régler le noyau T101 de telle sorte que la tension mesurée dans le mode de signaux, soit de 0mV dans la plage des 300mV.
	RÉGLAGE DE RF-FM					
4	Branchez le générateur de signaux FM à la borne d'antenne FM par l'intermédiaire d'une antenne fictive FM de 300Ω.	90MHz (modulé à 100% avec 400Hz) Entrée faible.	90MHz	Branchez un oscilloscope à la borne "SPEAKER".	T4 (bobine OSC) L1 (bobine ANT) L2 (bobine DET)	1. Appliquer une entrée faible de telle sorte que le bruit parasite soit inclus dans la forme de l'onde de sortie. 2. Faire le réglage de telle sorte que la forme de l'onde de sortie soit verticalement symétrique. (Voir Fig. 11). 3. Refaire les réglages (4) et (5) jusqu'à ce que la fréquence corresponde correctement avec la graduation du cadran.
5		106MHz (modulé à 100% avec 400Hz) Entrée faible.	106MHz	Branchez un oscilloscope à la borne "SPEAKER".	CT3 (trimmer OSC) CT1 (trimmer ANT) CT2 (trimmer DET)	
	RÉGLAGE DU SEUIL DE L'ACCORD SILENCIEUX					
6	Branchez le générateur de signaux FM à la borne d'antenne FM par l'intermédiaire d'une antenne fictive FM de 300Ω. Appliquer 21dB au synthonisateur.	100MHz (modulé à 100% avec 400Hz)	100MHz	Brancher un voltmètre électronique C.A. ou un oscilloscope aux bornes "SPEAKER".	VR101 (Seuil de l'accord silen cieux.)	1. Réglez le commutateur de mode/accord silencieux FM sur "on/AUTO". 2. Réglez de telle sorte qu'une puissance de sortie soit obtenue.

	GÉNÉRATEUR DE SIGNAUX AM/FM		FRÉQUENCE INDICATRICE	PRÉPARATIFS	PARTIES À RÉGLER	PROCÉDURE DE RÉGLAGE
	BRANCHEMENT	FRÉQUENCE				
	RÉGLAGE PILOTE MULTIPLEX FM					
	AVEC UN FRÉQUENCEMÈTRE				**EN UTILISANT UN SYSTÈME ALTERNATIF**	
7	1. Signal mono de 100MHz 60dB non modulé appliqué à l'appareil. 2. Commutateur de mode/accord silencieux FM sur "on/FM auto". 3. Branchez le fréquencemètre sur TP301 par l'intermédiare d'une résistance (100kΩ). 4. Régler **VR301** sur 19kHz±30Hz.				1. Appliquer un signal stéréophonique à l'appareil ou recevoir une émission stéréophonique. 2. Ajuster **VR301** et régler le contact à glissement de **VR301** au milieu de la plage en circuit de l'indicateur stéréophonique. (Voir Fig. 12.)	

ESPAÑOL

■ ESPECIFICACIONES (Estas especificaciones están sujetas a cualquier cambio sin previo eviso.)

(DIN 45 500)

■ SECCION AMPLIFICADOR

Potencia continua de 40 Hz~20 kHz en ambos canales	2 × 20W (4Ω) 2 × 20W (8Ω)
Potencia continua de 40 Hz~16 kHz en ambos canales	2 × 20W (4Ω) 2 × 20W (8Ω)
Potencia continua de 1 kHz en ambos canales	2 × 24W (4Ω) 2 × 22W (8Ω)
Distorsión armónica total	
potencia de régimen a 40 Hz~20 kHz	0,08% (4Ω) 0,04% (8Ω)
potencia de régimen a 40 Hz~16 kHz	0,08% (4Ω) 0,04% (8Ω)
potencia de régimen a 1 kHz	0,04% (4Ω) 0,04% (8Ω)
mitad de potencia a 1 kHz	0,009% (8Ω)
−26 dB de potencia a 1 kHz	0,1% (4Ω)
50 mW de potencia a 1 kHz	0,12% (4Ω)
Distorsión por intermodulación	
potencia de régimen a 250 Hz: 8 kHz=4:1, 4Ω	0,08%
potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,04%
Ancho de banda de potencia con ambos canales, −3 dB	10 Hz~30 kHz (4Ω)
Factor de amortiguamiento	15 (4Ω), 30 (8Ω)
Sensibilidad e impedancia de entrada	
TOCADISC. (PHONO)	2,5 mV/47kΩ
AUX. (AUX)	150 mV/22kΩ
GRAB. (TAPE)	150 mV/22 kΩ
CINTA GRAB./REPR. (TAPE, REC/PLAY)	180 mV/22kΩ
Voltaje máximo de entrada de PHONO (1 kHz, RMS)	150 mV
Relación de señal a ruido	
potencia de régimen (4Ω)	
TOCADISC. (PHONO)	70 dB (IHF, A: 73 dB)
AUX., GRAB. (AUX, TAPE)	88 dB (IHF, A: 95 dB)
−26 dB de potencia (4Ω)	
TOCADISC. (PHONO)	64 dB
AUX., GRAB. (AUX, TAPE)	66 dB
50 mW de potencia (4Ω)	
TOCADISC. (PHONO)	62 dB
AUX., GRAB. (AUX, TAPE)	62 dB
TOCADISC. (PHONO)	curva RIAA estándar ±0,8 dB (30 Hz~15 kHz)
AUX., GRAB. (AUX, TAPE)	7 Hz~70 kHz (−3 dB)
Controles de tono	
BAJOS (BASS)	50 Hz, +10 dB~ −10 dB
AGUDOS (TREBLE)	20 kHz, +10 dB~ −10 dB
Control de sonoridad (volumen a −30 dB)	50 Hz, +9 dB
Voltaje e impedancia de salida	
GRAB. SAL. GRAB.(TAPE REC OUT)	150 mV
GRAB./REPR. (TAPE REC/PLAY)	30 mV/82kΩ
Equilibrio de canales, AUX 250 Hz~6 300 Hz	±1 dB
Separación de canales, AUX 1 kHz	55 dB
Impedancia y nivel de salida de los auriculares	210 mV/330Ω
Impedancia de carga	
MAIN o REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

■ SECCION PARA SINTONIZADOR FM

Gama de frecuencias	87,5~108 MHz
Sensibilidad	
Señal a ruido 30 dB	1,9 μV (300Ω), 1,3 μV (75Ω)
Señal a ruido 26 dB	1,7 μV (300Ω), 1,2 μV (75Ω)
Señal a ruido 20 dB	1,5 μV (300Ω), 0,9 μV (75Ω)
Sensibilidad utilizable IHF	1,9 μV (IHF '58)
Sensibilidad de acallamiento estéreo de 46 dB IHF	22 μV/75Ω
Distorsión armónica total	
MONO. (MONO)	0,15%
ESTEREO (STEREO)	0,3%
Relación de señal a ruido	
MONO. (MONO)	60 dB (77 dB, IHF)
ESTEREO (STEREO)	58 dB (70 dB, IHF)
Respuesta de frecuencia	20 Hz~15 kHz, +1 dB~ −2 dB
Selectividad alternada de canal	60 dB
Relación de captura	1;0 dB
Rechazo de imagen a 98 MHz	55 dB
Rechazo de F.I. a 98 MHz	70 dB
Rechazo de respuesta espuria a 98 MHz	80 dB
Supresión AM	50 dB
Separación estereofónica	
1 kHz	40 dB
10 kHz	30 dB
Fuga de onda portadora	
19 kHz	−35 dB (−35 dB, IHF)
38 kHz	−50 dB (−50 dB, IHF)
Equilibrio de canales 250 Hz~6 300 Hz	±1,5 dB
Punto de límite	1,2 μV
Ancho de banda	
Amplificador FI	180 kHz
Demodulador FM	1000 kHz
Bornes de antena	300Ω (equilibrado) 75Ω (no equilibrado)

■ SINTONIZADOR AM

Gama de frecuencias	525~1605 kHz
Sensibilidad (Relación de señal a ruido de 20 dB)	30 μV, 300 μV/m
Selectividad	27 dB
Rechazo de imagen a 1.000 kHz	45 dB
Rechazo de F.I. a 1.000 kHz	55 dB

■ GENERAL

Consumo de energía	210W
Alimentación de energía	CA 50 Hz/60 Hz, 220V (Para Europa continental) CA 50 Hz/60 Hz, 110V/120V/220V/240V (Para otros países)
Dimensiones (An.×Al.×Prof.)	430 × 97 × 260 mm
Peso	5,4 kg

■ MEDICIONES Y AJUSTES

AJUSTE DE AM

• Puesta y Uso de equipo
1. Voltímetros electrónicos de CA y CC (VTVM).
2. Generador de señales AM (AM-SG).
3. Osciloscopio.
4. Mantener voltaje de línea a voltaje nominal.
5. La salida de generador de señales no debe ser mayor que la necesaria para obtener una lectura de salida.
6. Saque hacia fuera la antena de varilla de ferrita AM (L201).
7. Para el ajuste use un destornillador no metálico.

	AM/FM GENERADOR DE SEÑALES		A FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE
	CONEXION	FRECUENCIA				
	AJUSTE RF-AM					
1	Conectar AM-SG a terminal de antena AM a través de capacitor 200pF. Común a chasis. (Entrada débil).	600kHz (Mod. 30% con 400Hz)	600kHz	Conectar VTVM de CA u osciloscopio a terminales de "SPEAKER" (altavoz).	L202 (Bobina OSC AM) L201 (Bobina ANT AM)	1. Ajustar para salida máxima. 2. Ajustar L201 moviendo carrete de bobina a lo largo de núcleo de ferrita.
2		1500kHz (Mod 30% con 400Hz)	1500kHz	Conectar VTVM de CA u osciloscopio a terminales de "SPEAKER" (altavoz).	CT202 (Trimer de OSC AM) CT201 (Trimer de ANT AM)	1. Ajustar para salida. máxima. 2. Repetir pasos (1) y (2).

AJUSTE DE FM

• Equipo usado
1. Generador de señales FM (FM. SG).
2. Modulador estereofónico (o medidor de separación).
3. Osciloscopio.
4. Voltímetros electrónicos de CA y CC (VTVM).
5. Frecuencímetro (19kHz y 108MHz medibles).
6. Antena ficticia de 300Ω FM.

• Preparación de generador de señales FM (FM. SG).
1. Conectar modulador estereofónico a FM. SG.
2. Aplicar salida SG a terminal de antena del aparato a través de antena ficticia de 300Ω FM.
3. La entrada standard del aparato es 60dB (1mV), modulación 100% 400Hz (Por el uso de antena ficticia, la salida de SG ha de ser 12dB más (IHF). Es decir, cuando entrada es 60dB, salida de SG ha de ser 72dB).

• Puesta
1. Selector de banda.....FM.
2. Interruptor silenciador/modalidad FM.....off/mono.

	AJUSTE IF-FM					
3	——	No señal.	Punto de no interferencia.	Conectar VTVM CC entre terminal T103 y T104 a través de bobina de choque. (Referir a Fig. 10).	T101 (Discri. IFT)	• Ajustar núcleo de T101 de manera que voltaje medido en modalidad de señal se 0mV en gama de 300mV.
	AJUSTE RF. FM					
4	Conectar FM. SG a terminal de antena FM a través de antena ficticia de 300Ω FM.	90MHz (Mod. 100% con 400Hz) Entrada débil.	90MHz	Conectar osciloscopio a terminal de "SPEAKER" (altavoz).	L4 (Bobina OSC) L1 (Bobina ANT) L2 (Bobina DET RF)	1. Añadir entrada débil de manera que ruido se incluya en la forma de onda de salida. 2. Hacer el ajuste de manera que la forma de onda de salida sea verticalmente simétrica. (Fig. 11). 3. Repetir los pasos (4) y (5) hasta que la frecuencia se adapte correctamente a la escala del cuadrante.
5		106MHz (Mod. 100% con 400Hz) Entrada débil.	106MHz	Conectar osciloscopio a terminal de "SPEAKER" (altavoz).	CT3 (Trimer OSC) CT1 (Trimer ANT) CT2 (Trimer DET RF)	
	AJUSTED DE NIVEL SILENCIADOR DE FM					
6	Conectar FM. SG a terminal de antena FM a través de antena ficticia de 300Ω FM. Aplicar 21dB a sintonizador.	100MHz (Mod. 100% con 400Hz)	100MHz	Conectar VTVM CA o osciloscopio a terminales de "SPEAKER".	VR101 (Nivel silenciador)	1. Poner la modalidad/ silenciador FM en "on/auto". 2. Ajustar de manera que puede obtenerse salida.

AJUSTE DE V.C.O.MPX de FM

	USANDO UN FRECUENCIMETRO	USANDO SISTEMA ALTERNATIVO
7	1. Señal mono no modulada de 100MHz 60dB aplicada al aparato. 2. Interruptor de modalidad/sinlenciador FM a "on/auto FM". 3. Conectar frecuéncimetro a TP301 a través de resistor (100kΩ). 4. Ajustar **VR301** a 19kHz±30Hz.	1. Aplicar una señal estereofónica al aparato o recibir una emisión estereofónica. 2. Ajustar **VR301** y fijar el contacto deslizante de **VR301** en el medio de la gama-ON del indicador estereofónico. (Vea la Fig. 12.)

Printed in Japan
82034600 ⊗ TK